

TRANSPORTATION IMPACT ASSESSMENT

PROPOSED MIXED-USE DEVELOPMENT BROOKLINE, MASSACHUSETTS

Prepared for:

Oakgrove Residential
Brookline, Massachusetts

August 2016

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EXECUTIVE SUMMARY

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to identify the traffic impacts associated with the proposed mixed-use development located at 420 Harvard Street in Brookline, Massachusetts. As currently proposed, the project will consist of the redevelopment of three (3) apartment units and 6,177 sf of office space into 36 apartment units and 2,650 square feet (sf) of office/retail space. Currently the office space is utilized by a ReMax office which will be staying and renting out the 2,650 sf of retail/office space in the proposed development.

The project site is situated on the west side of Fuller Street and the south side of Harvard Street. Access to the project site will be provided by way of the existing driveway onto Fuller Street. Parking will be provided for 38 vehicles.

This study was prepared in accordance with the Massachusetts Department of Transportation (MassDOT) Guidelines for Transportation Impact Assessments (TIAs), including MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. Based upon the results of this study, the following can be concluded:

- The Project was shown to generate approximately 109 vehicle trips on an average weekday (two-way, 24-hour volume, or 2 vehicles entering and 6 exiting), with approximately 8 vehicle trips (2 vehicles entering and 6 exiting) expected during the weekday morning peak-hour. During the weekday evening peak hour the Project is expected to generate approximately 10 vehicle trips (6 vehicles entering and 4 exiting).
- The Project is not projected to have a significant impact (increase) on motorist delays from the 2023 No-Build to the 2023 Build conditions.

Overall, the project can safely be accommodated in the area with the implementation of following recommendations.

RECOMMENDATIONS

A meeting was held with the Town of Brookline Engineering Department on July 7, 2016 to discuss the project. Based on those discussions the following improvements have been recommended as a part of this evaluation to provide safe and efficient access to the project and address any deficiencies identified at off-site locations evaluated in conjunction with this study.

Site Access

Access to the Project site will be provided via an existing full access/egress driveway onto Fuller Street. Signs and landscaping adjacent to the Project driveways and within the Project site should be designed and maintained so as not to restrict lines of sight. In addition, all signs and pavement markings to be installed within the Project should conform to the specifications of the *Manual on Uniform Traffic Control Devices (MUTCD)*¹.

Parking Summary

Surface parking should be provided on site which and accessed via Fuller Street. Two additional surface parking spaces that currently exist on Coolidge Street should also be available for resident/customer use. Additional below grade parking should be provided for residential/customer use. A total of 38 parking spaces should be provided, 2 located on Coolidge Street and 36 accessed via the Fuller Street site drive.

Transit/Bicycle

An indoor space will be dedicated as a Bike room and outdoor Bike racks should be installed on the property. A rate of approximately one Bike rack per unit should be considered. Transit schedules should be posted on site.

Delivery/Trash Services

Trash pick-up will be handled by a private service. Trash pick-up and delivery services will utilize a loading zone located on Coolidge Street. Loading will be permitted during business hour only, 9:00 AM to 5:00 PM.

With implementation of the above recommendations, safe and efficient access and egress will be provided and the planned development can be accommodated safely.

¹*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C., 2009

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to identify the traffic impacts associated with the proposed mixed-use development located at 420 Harvard Street in Brookline, Massachusetts. This report identifies and analyzes existing and future traffic conditions both with and without the project and reviews access requirements, potential off-site improvements, and safety considerations.

PROJECT DESCRIPTION

The Project entails the redevelopment of 3 apartment units and 6,177 sf of office space into 36 apartment units and 2,650 sf of office/retail space to be located at 420 Harvard Street in Brookline, Massachusetts. The project site is situated on the west side of Fuller Street and the south side of Harvard Street. Access to the project site will be provided by way of an existing curb cut on Fuller Street. Parking will be provided for 38 vehicles.

STUDY METHODOLOGY

This study was prepared in general accordance with the state guidelines for Transportation Impact Assessments (TIA); and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; observations of traffic flow; and collection of daily and peak period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the project were assessed along with future traffic demands due to expected traffic growth independent of the project. A seven-year time horizon was selected for analyses consistent with state guidelines for the preparation of TIA. The traffic analysis conducted in stage two identifies existing or projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any, identified in stage two of the study.

EXISTING CONDITIONS

A comprehensive field inventory of traffic conditions on the study area roadways was conducted. The field investigation consisted of an inventory of existing roadway geometrics, traffic volumes, and operating characteristics, as well as posted speed limits and land use information within the study area. The study area for the project was selected to contain the major roadway providing access to the project site, Harvard Street, as well as two intersections located near the site:

1. Harvard Street at Fuller Street
2. Harvard Street at Coolidge Street

The following describes the study area roadway and intersection. Figure 1 provides a Study Location Map.

GEOMETRY

Roadways

Harvard Street

Harvard Street, in the vicinity of the site, is under the jurisdiction of the Town of Brookline and generally travels in a north/south orientation in Brookline Massachusetts. Harvard Street accommodates a two-lane roadway in each direction with travel separated by a double yellow centerline. Concrete sidewalks are provided along both sides of Harvard Street. Bike paths are provided along either side of Harvard Street or the vehicle lanes are marked as shared vehicle and bicycle lanes. Parking is also provided intermittently along both sides of Harvard Street. Land use along Harvard Street consists primarily of commercial properties. No speed limit is posted on Harvard Street in the vicinity of the site.

Intersections

Harvard Street at Fuller Street

Harvard Street is intersected by Fuller Street from the east and west to from this four-way signalized intersection. The Fuller Street eastbound approach consists of an approximately 11.5-foot wide general purpose travel lane with a concrete sidewalk. The Fuller Street westbound approach consists of an approximately 14-foot wide general purpose travel lane with a concrete sidewalk. There is a marked crosswalk across both Fuller Street approaches and direction of travel on Fuller Street is separated by a

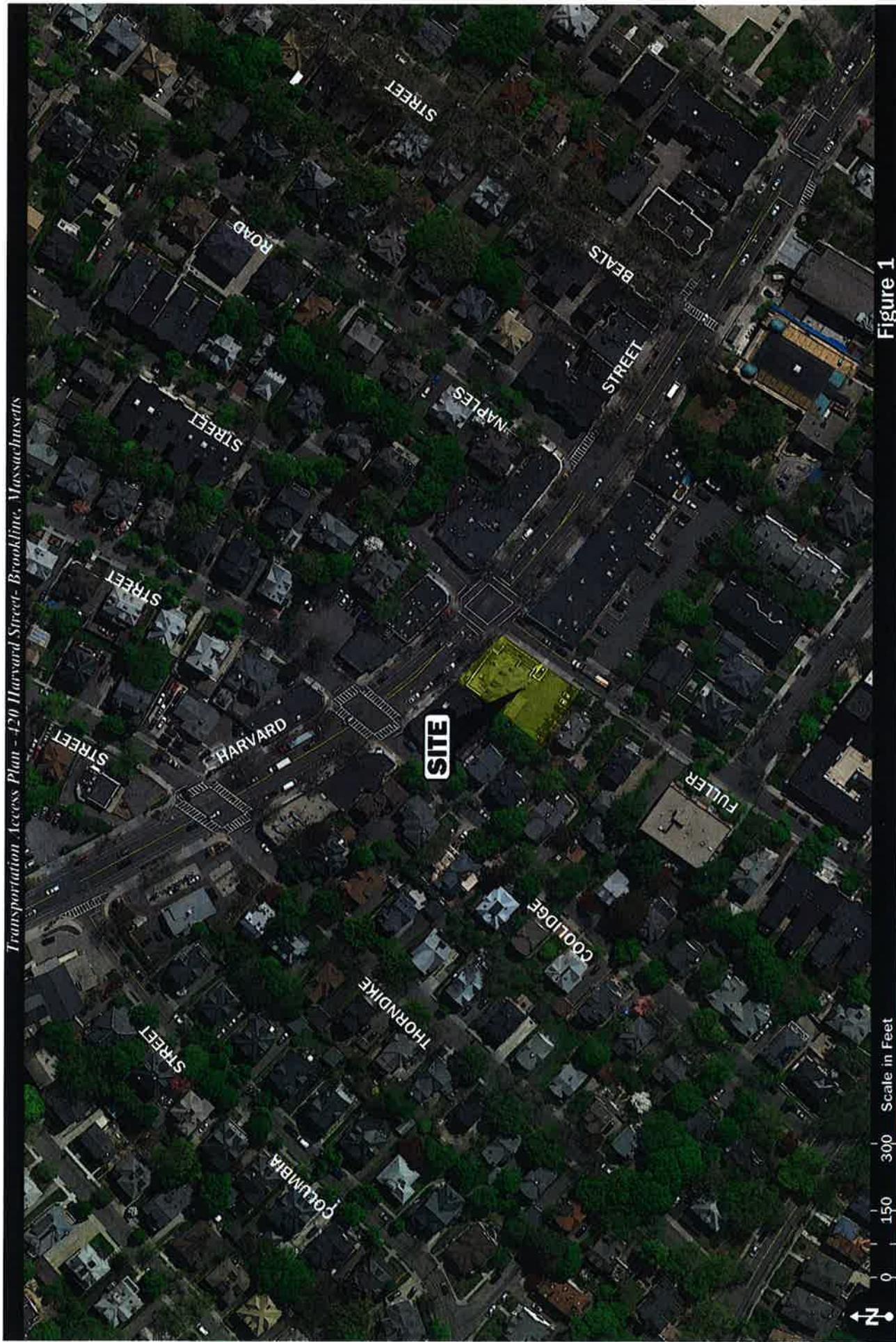


Figure 1

Site Location Map

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double yellow centerline. The Harvard Street northbound approach consists of an approximately 10.5-foot wide exclusive left-turn lane and an approximately 11-foot wide shared though movement and right-turn lane with 7-foot wide parking spaces and a concrete sidewalk. The through movement lane is marked as a shared vehicle and bicycle lane. The Harvard Street southbound approach consists of an approximately 10-foot wide exclusive left-turn lane and an approximately 11-foot wide shared though movement and right-turn lane with 7-foot wide parking spaces and a concrete sidewalk. The through movement lane is marked as a shared vehicle and bicycle lane. There is a marked crosswalk across both Harvard Street approaches and direction of travel on Harvard Street is separated by a double yellow centerline. The signal is a two phase signal with an exclusive pedestrian phase. Right turn on red is restricted on each approach to the intersection. Land use in the vicinity of this intersection consists primarily of commercial properties.

Harvard Street at Coolidge Street

Harvard Street is intersected by Coolidge Street from the east and west to from this four-way intersection under STOP-sign control. The Coolidge Street eastbound approach consists of an approximately 23-foot wide roadway with a concrete sidewalk. The Coolidge Street westbound approach consists of an approximately 25.5-foot wide roadway with a concrete sidewalk. There is a marked crosswalk along both of the Coolidge Street approaches. The Harvard Street northbound approach consists of an approximately 10-foot wide general purpose travel lane with a 5-foot wide marked bike lane, 7-foot wide parking spaces, and a concrete sidewalk. The Harvard Street southbound approach consists of an approximately 13-foot wide general purpose travel lane with a 5-foot wide bike lane, 7-foot wide parking spaces, and a concrete sidewalk. There is a marked crosswalk across both Harvard Street approaches and the direction of travel on Harvard Street is separated by a double yellow centerline. Land use in the vicinity of this intersection consists primarily of commercial properties.

EXISTING TRAFFIC VOLUMES

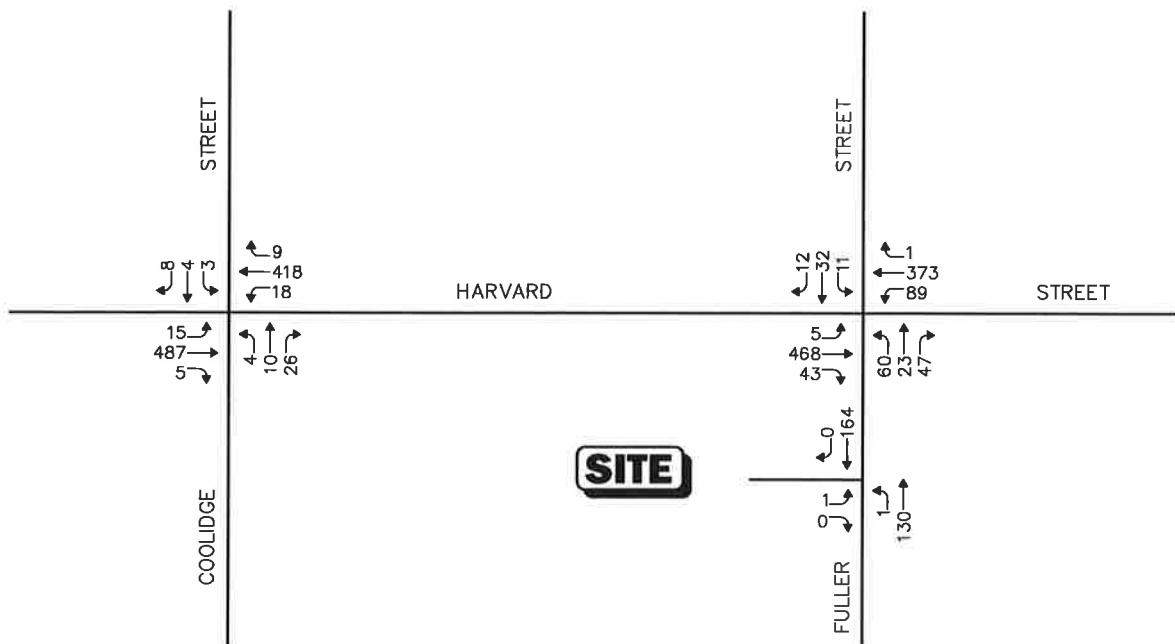
In order to establish existing traffic-volume demands and flow patterns within the study area manual turning movement counts (TMCs), vehicle classification counts were completed. The TMC's were completed in July 2016. Manual TMCs were performed from 7:00 to 9:00 AM and from 4:00 to 6:00 PM for an average weekday at the study intersections.

Traffic Volume Adjustments

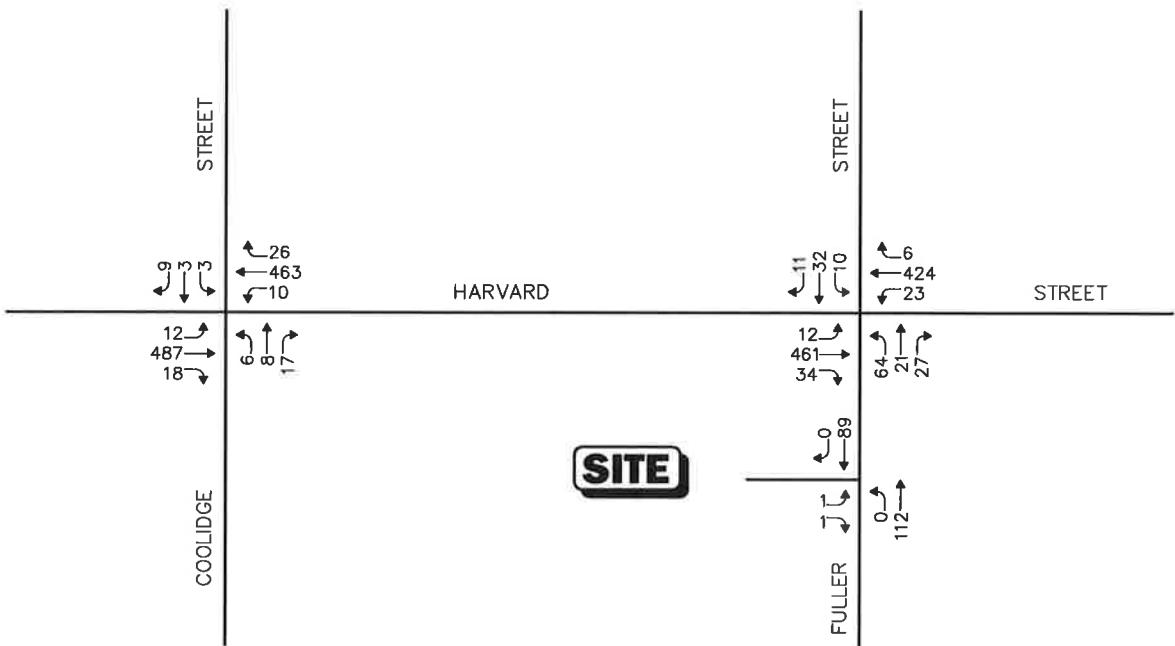
In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, the MassDOT Weekday Seasonal Factors for Group 6 Roadways (urban arterials, collectors and rural arterials) were reviewed. Based on a review of this data, it was determined that traffic volumes for the month of July were representative of above-average month conditions and were not adjusted downward to average-month conditions in order to provide a conservative (above-average) analysis scenario. The Existing traffic volumes are graphically depicted in Figure 2.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 8:00 and 9:00 AM, with the weekday evening peak hour generally occurring between 5:00 and 6:00 PM.

WEEKDAY MORNING PEAK HOUR



WEEKDAY EVENING PEAK HOUR



Not To Scale


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Figure 2

2016 Existing
Peak Hour Traffic Volumes

PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in July 2016. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of bicycle facilities. Sidewalks are provided along the east and west sides of Harvard Street, and along the north and south sides of Fuller Street and Coolidge Street. Marked crosswalks are provided along each approach to both the study area intersections. A bike lane is provided along the east and west sides of Harvard Street.

PUBLIC TRANSPORTATION

Public transportation services are provided within the study area by the Massachusetts Bay Transit Authority (MBTA). The MBTA operates fixed-route bus services in the vicinity of the site. Bus Route 57/57A – Watertown Yard or Oak Square – Kenmore Station stops at the intersection of Brighton Avenue at Commonwealth Avenue which is approximately 2,700 feet north of the project site. Bus Route 66 – Harvard Station – Dudley Station stops at the intersection of Harvard Street at Coolidge Street which is approximately 200 feet northeast of the project site. The MBTA Green Line B Branch runs along Beacon Street and Commonwealth Avenue with local stops at Packards Corner and Harvard Avenue which are approximately 2,400 feet north and 2,100 feet northwest from the project site respectively. The Green Line C Branch runs from Cleveland Circle to North Station with local stops at Coolidge Corner and Summit Avenue which are approximately 2,100 feet southeast and 1,700 feet south from the project site respectively.

PARKING SUMMARY

On Street parking in the vicinity of the site generally consists of metered parking. The metered parking is located on Harvard Street. Harvard Street has 10 metered parking spaces with a 2-hour limit between Coolidge Street and Fuller Street. The 2-hour metered parking spaces are in use from 8:00 AM to 8:00 PM Monday through Saturday, Sundays and holidays excluded. Fuller Street does not allow parking on the south side and Coolidge Street does not allow parking on the north side. On-site parking currently consists of 10 striped spaces.

MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2010 through 2014) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, pavement condition and severity.

Table 1
MOTOR VEHICLE CRASH DATA SUMMARY^a

Scenario	Harvard Street at Fuller Street	Harvard Street at Coolidge Street
<i>Year:</i>		
2010	0	0
2011	2	0
2012	4	1
2013	1	0
<u>2014</u>	<u>1</u>	<u>2</u>
Total	<u>8</u>	<u>3</u>
Average ^b	1.6	0.6
<i>Type:</i>		
Angle	1	0
Rear-End	1	1
Head-On	1	0
Sideswipe	4	1
Fixed Object	1	0
<u>Other</u>	<u>0</u>	<u>1</u>
Total	<u>8</u>	<u>3</u>
<i>Pavement Conditions:</i>		
Dry	6	3
Wet	2	0
Snow/Ice	0	0
<u>Unknown/ Other</u>	<u>0</u>	<u>0</u>
Total	<u>8</u>	<u>3</u>
<i>Severity:</i>		
Property Damage Only	4	1
Personal Injury	4	2
Fatality	0	0
<u>Unknown</u>	<u>0</u>	<u>0</u>
Total	<u>8</u>	<u>3</u>

^aAverage crash over five-year period.

^bCrash rate per million entering vehicles (mev).

Source: MassDOT Crash Data, 2010 through 2014.

As can be seen in Table 1, the intersection of Harvard Street at Fuller Street experienced a total of 8 accidents reported over the five-year review period, averaging 1.6 accidents per year. The majority of the accidents were sideswipe collisions (4 out of 8), occurred on dry pavement (6 out of 8), and resulted in property damage only (4 out of 8). The intersection of Harvard Street at Coolidge Street experienced a total of 3 accidents reported over the five-year review period, averaging 0.6 accident per year. The accidents consisted of one rear-end collision, one sideswipe collision, and one other type of collision. All of the accidents occurred on dry pavement and two of the three accidents resulted in property damage only. No fatalities were reported at the study area intersections over the five-year review period.

FUTURE CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2023. Traffic volumes on the roadway network at that time, in the absence of the project (that is, the No-Build condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others expected to be completed by 2023. Inclusion of these factors resulted in the development of 2023 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop the 2023 Build traffic-volume conditions.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development in the immediate area, as well as the surrounding region. Several methods are used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used.

General Background Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on a review of this data and other area traffic studies, a 1.0 percent per year compounded annual background traffic growth rate was used in order to conservatively account for future traffic growth and presently unforeseen development within the study area.

Specific Development by Others

The Town of Brookline was contacted in order to determine if there are any planned or approved specific development projects within the area that would have an impact on future traffic volumes at the study intersections. Based on these discussions the following projects were identified:

384 Harvard Street – The 384 Harvard Street project consists of the construction of 62 affordable apartment units for seniors and 2,534 sf of commercial space. A total of 14 on-site parking spaces will be provided. Site access is provided via an existing driveway onto Williams Street. The traffic volumes expected to be generated by this project have been added to the future condition networks.

345 Harvard Street – The Edward Devotion School expansion will add 178,535 sf of floor area. The school will then consist of a total 234833 sf of floor area which includes 30,676 sf of garage space. The traffic volumes expected to be generated by this project have been added to the future condition networks.

40 Center Street – The 40 Centre Street project entails the transit oriented development of 45 apartments. The project site is situated on the west side of Centre Street just north of Beacon Street. Access to the project site will be provided by way of a 20-foot wide driveway onto Centre Street. Parking will be provided for 17 vehicles. The traffic volumes expected to be generated by this project have been added to the future condition networks.

1299 Beacon Street – The 1299 Beacon Street project entails the development of 108 affordable apartment units for seniors. The traffic volumes expected to be generated by this project have been added to the future condition networks.

Planned Roadway Improvements

The Town of Brookline was contacted in order to determine if there are any planned roadway improvement projects expected to be completed within the study area. Based on these discussions no improvements beyond basic maintenance is planned within the study area.

No-Build Traffic Volumes

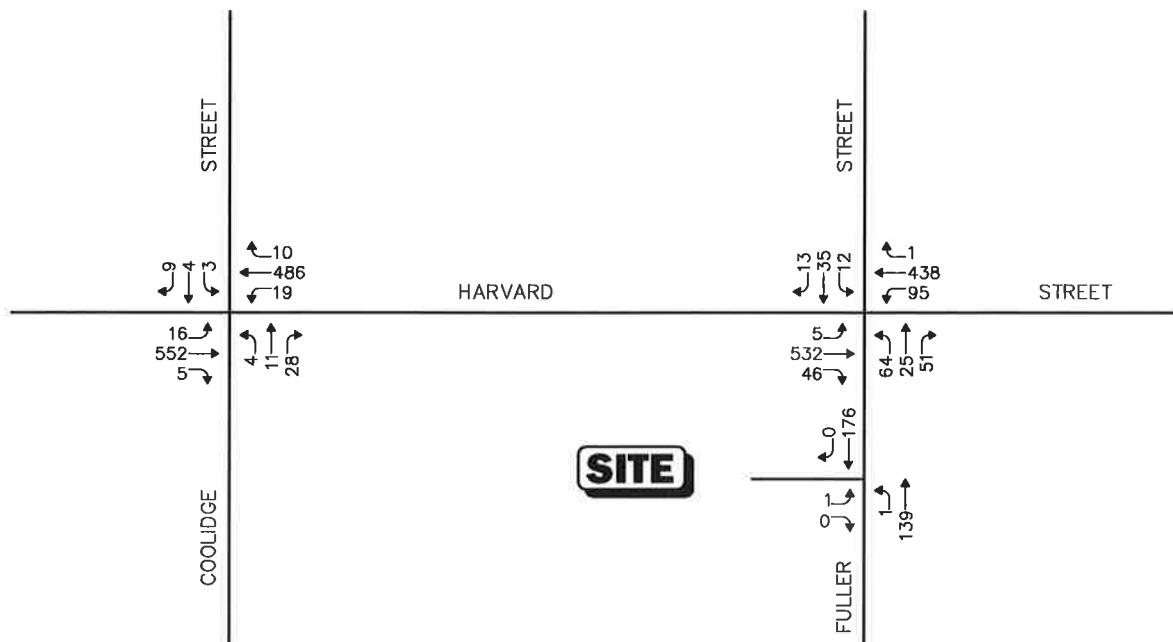
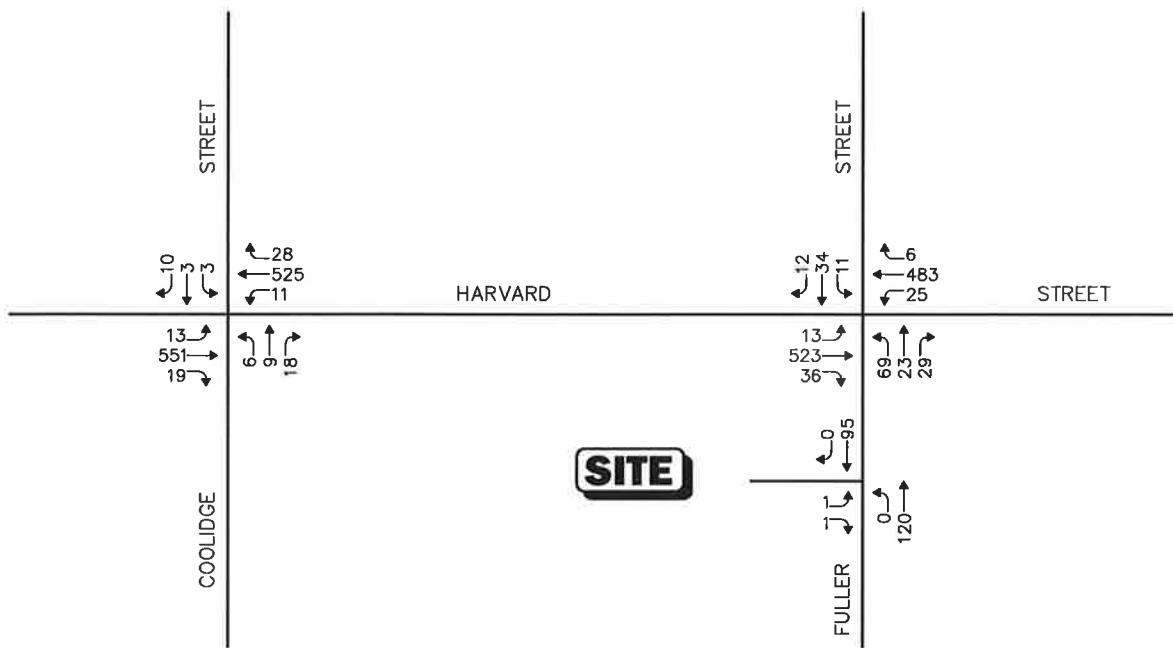
The 2023 No-Build peak-hour traffic-volume networks for weekday morning and weekday evening were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the Existing peak-hour traffic volumes. The resulting 2023 No-Build weekday morning and weekday evening peak-hour traffic volume networks are shown on Figure 3.

PROJECT-GENERATED TRAFFIC

The 2023 Build traffic volumes for the study area roadways were determined by estimating project-generated traffic volumes and assigning those volumes on the study roadways.

The project entails the development of a 36 apartment units and 2,650 sf of retail/office space. Currently there are three (3) apartment units on site and ReMax, a real estate company, rents out space. Existing Site trips are summarized in Table 2 below. ReMax will continue to work out of this space after the construction is completed. In order to develop the traffic characteristics of the 36 apartment units, trip-generation statistics published by the Institute of Transportation Engineers (ITE)² for LUC 220,

²*Trip Generation Manual*, Ninth Edition; Institute of Transportation Engineers; Washington, DC; 2012.

WEEKDAY MORNING PEAK HOUR**WEEKDAY EVENING PEAK HOUR**

Not To Scale



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Figure 3

**2023 No-Build
Peak Hour Traffic Volumes**

Apartments were used. Vehicle trip estimates were adjusted to account for transit trips and other travel mode trips. A summary of the expected vehicle trip generation is summarized in Table 3.

Table 2
EXISTING TRIP SUMMARY

Time Period	Existing Site Trips ^a
Average Weekday Daily Traffic	--
<i>Weekday Morning Peak Hour:</i>	
Entering	1
<u>Exiting</u>	<u>1</u>
Total	2
<i>Weekday Evening Peak Hour:</i>	
Entering	0
<u>Exiting</u>	<u>2</u>
Total	2

^aSource: Manual turning movement counts conducted in July 2016.

Table 3
TRIP GENERATION SUMMARY

Time Period	Residential Trips ^a 36 Units (B)	Public Transit/Other Travel Mode Trips E = D*54.7% ^b	New Trips G = F/C
Average Weekday Daily Traffic	240	131	109
<i>Weekday Morning Peak Hour:</i>			
Entering			
<u>Exiting</u>	4	2	2
Total	<u>14</u>	<u>8</u>	<u>6</u>
	18	10	8
<i>Weekday Evening Peak Hour:</i>			
Entering	14	8	6
<u>Exiting</u>	<u>8</u>	<u>4</u>	<u>4</u>
Total	22	12	10

^aBased on ITE LUC 220, Apartment

^bBased on journey to work data for Brookline obtained from the United States Census Bureau, ACS 2010-2014.

As can be seen in Table 3, the Project is expected to generate approximately 109 vehicle trips on an average weekday (two-way, 24-hour volume, with approximately 8 vehicle trips (2 vehicles entering and 6 exiting) expected during the weekday morning peak-hour. During the weekday evening peak hour the

Project is expected to generate approximately 10 vehicle trips (6 vehicles entering and 4 exiting).

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated trips to and from the proposed development was determined based on a review of existing travel patterns at the study area intersections and journey to work data for Brookline obtained from the United States Census Bureau ACS 2010-2014. The general trip distribution for the project is summarized in Table 4 and graphically depicted on Figure 4. The weekday morning and weekday evening peak-hour traffic volumes expected to be generated by the project were assigned on the study area roadway network as shown on Figure 5.

Table 4
TRIP-DISTRIBUTION SUMMARY

Roadway	Direction (To/From)	Residential (To/From)
Fuller Street	West	15/25
Harvard Street	North	50/50
Harvard Street	South	<u>35/25</u>
TOTAL		100/100

FUTURE TRAFFIC VOLUMES – BUILD CONDITION

The 2023 Build condition networks consist of the 2023 No-Build traffic volumes with the anticipated site-generated traffic added to them. The 2023 Build weekday morning and weekday evening traffic-volume networks are graphically depicted on Figure 6.

A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 5. These volumes are based on the expected increases from the project.



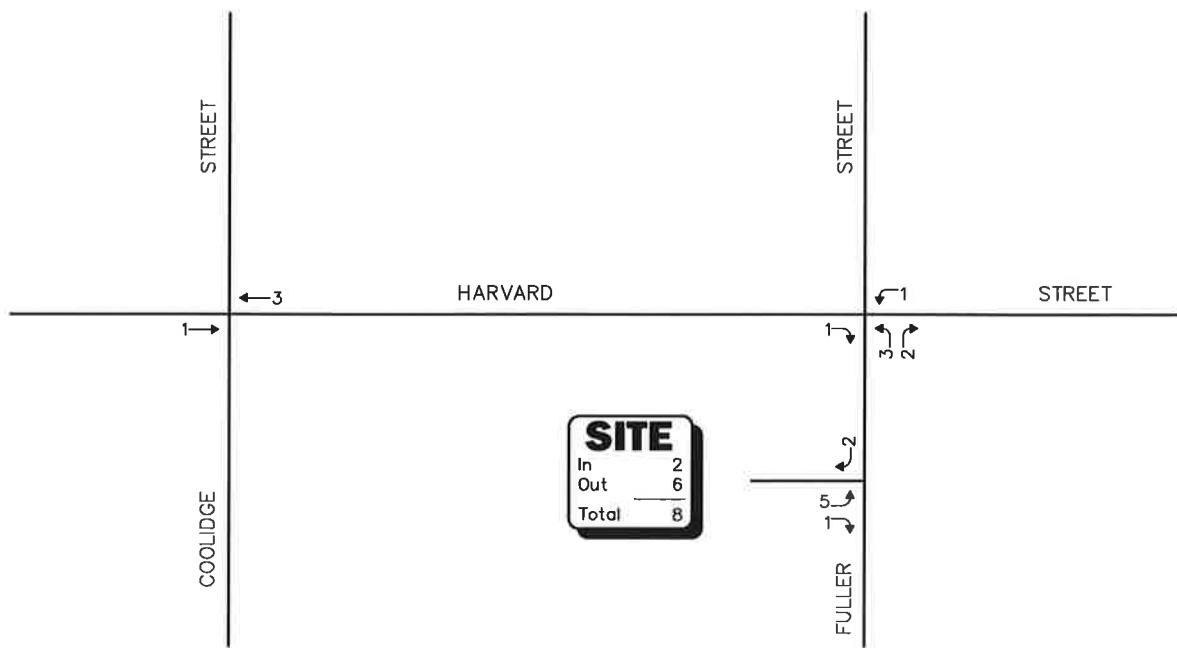
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Figure 4

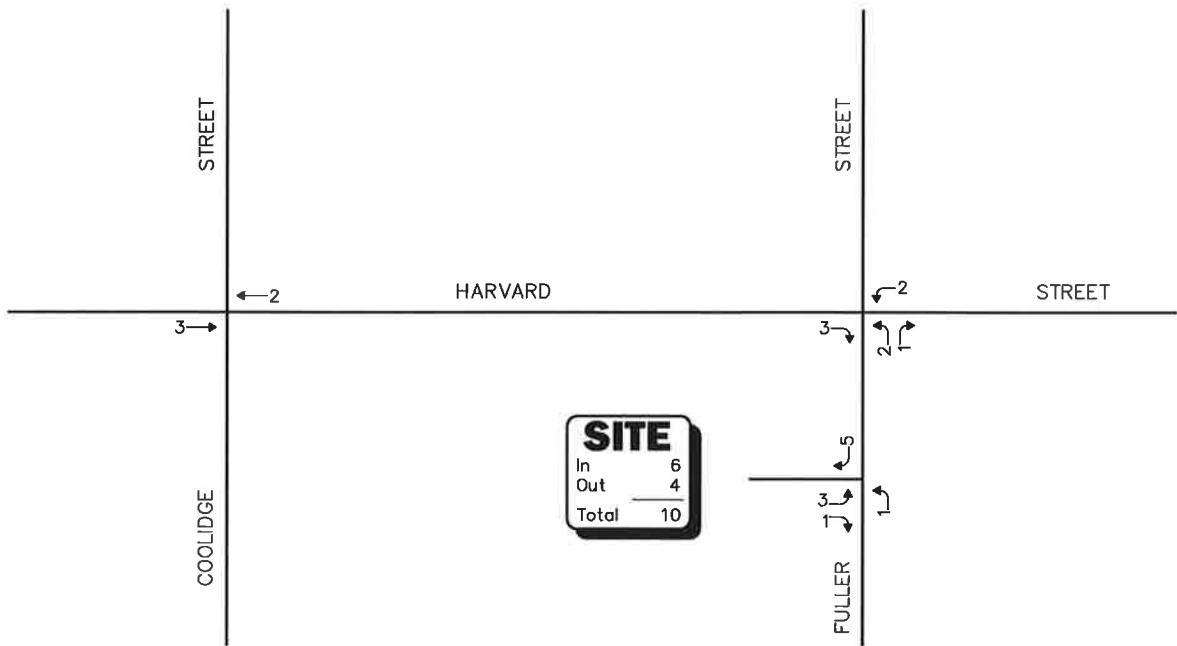
Trip Distribution Map



WEEKDAY MORNING PEAK HOUR



WEEKDAY EVENING PEAK HOUR



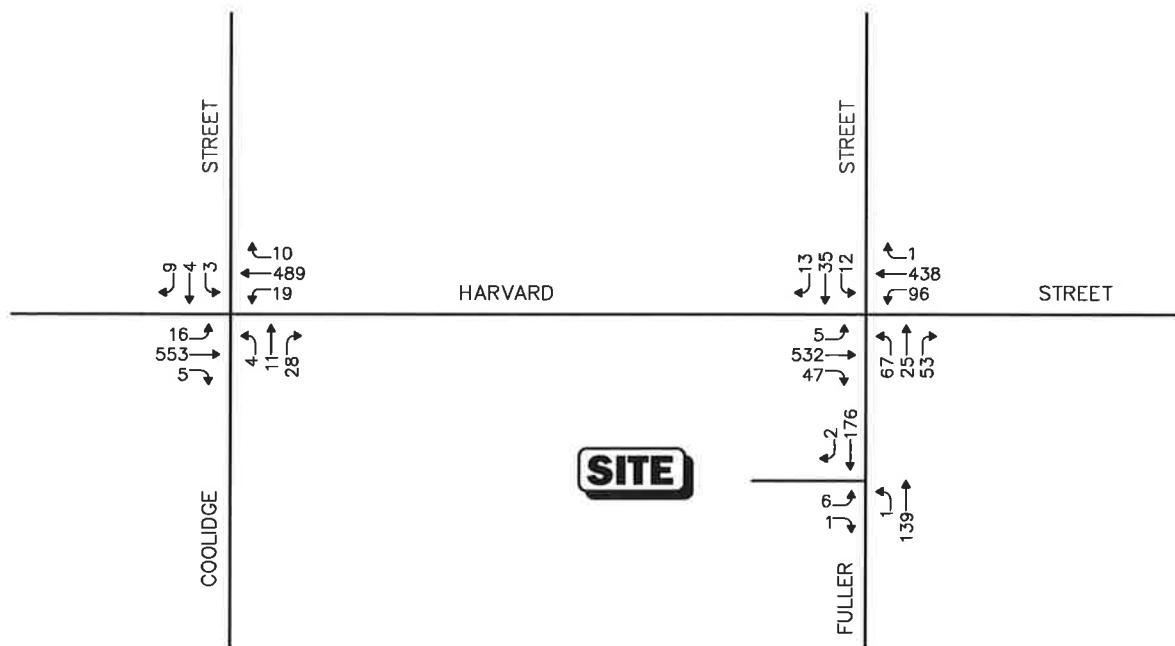
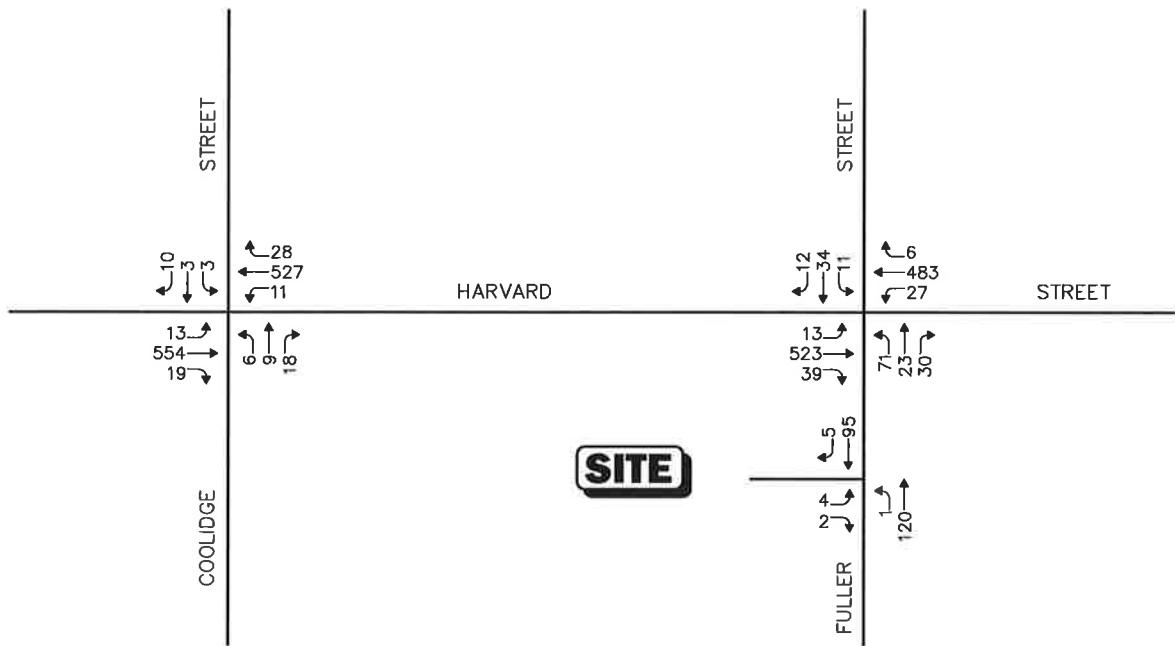
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Figure 5



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**Site Generated
Peak Hour Traffic Volumes**

WEEKDAY MORNING PEAK HOUR**WEEKDAY EVENING PEAK HOUR**

Not To Scale


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Figure 6
2023 Build
Peak Hour Traffic Volumes

Table 5
PEAK-HOUR TRAFFIC-VOLUME INCREASES

Location/Peak Hour	2023 No-Build	2023 Build	Traffic Volume Increase Over No-Build	Percent Increase Over No-Build
<i>Fuller Street, west of Site Drive:</i>				
Weekday Morning	316	317	1	0.3
Weekday Evening	216	218	2	0.9
<i>Harvard Street, north of Coolidge Street:</i>				
Weekday Morning	1,072	1,076	4	0.4
Weekday Evening	1,124	1,129	5	0.5
<i>Harvard Street, south of Fuller Street:</i>				
Weekday Morning	1,129	1,132	3	0.3
Weekday Evening	1,077	1,080	4	0.4

As shown in Table 5, project-related traffic-volume increases external to the study area relative to 2023 No-Build conditions are anticipated to range from 0.3 to 0.9 percent during the peak periods.

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.³ The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

³The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the 2010 *Highway Capacity Manual*.⁴ Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the 2010 *Highway Capacity Manual*. Table 6 summarizes the relationship between level of service and average control delay for two way stop controlled and all-way stop controlled intersections.

Table 6
LEVEL-OF-SERVICE CRITERIA FOR
UN SIGNALIZED INTERSECTIONS^a

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
v/c ≤ 1.0	v/c > 1.0	
A	F	≤10.0
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	>50.0

^aSource: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010; page 19-2.

⁴*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

Signalized Intersections

The six levels of service for signalized intersections may be described as follows:

- * *LOS A* describes operations with very low control delay; most vehicles do not stop at all.
- * *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- * *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- * *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- * *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- * *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the 2010 *Highway Capacity Manual*. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. Level-of-service designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 7 summarizes the relationship between level of service and control delay. The tabulated control delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 7
LEVEL-OF-SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS^a

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
$v/c \leq 1.0$	$v/c > 1.0$	
A	F	≤ 10.0
B	F	10.1 to 20.0
C	F	20.1 to 35.0
D	F	35.1 to 55.0
E	F	55.1 to 80.0
F	F	>80.0

^aSource: *Highway Capacity Manual*; Transportation Research Board; Washington, DC, 2010; page 18-6.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2016 Existing, 2023 No-Build, and 2023 Build conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with a tabular summary provided in Table 8 and 9.

Unsignalized Intersection Analysis Results

Harvard Street at Coolidge Street

Under all conditions during both the weekday morning and weekday evening peak hours the Coolidge Street movements operate at LOS C and the Harvard Street movements operate at LOS A. The proposed Project is projected to result in a minimal impact on approach delays at this location, as compared to the 2023 No-Build conditions.

Fuller Street at Site Drive

Under all conditions during the weekday morning peak hour the Site driveway operates at LOS B and during the weekday evening peak hour the Site driveway operates at LOS A. The proposed Project is projected to result in a minimal impact on approach delays at this location, as compared to the 2023 No-Build conditions.

Signalized Intersection Analysis Results

Harvard Street at Fuller Street

Under all conditions, this intersection operates at an overall LOS B during the weekday morning and the weekday evening peak hours. The proposed Project is projected to result in a minimal impact on approach delays at this location, as compared to the 2023 No-Build conditions.

Table 8
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Unsignalized Intersection/ Critical Movement/Peak Hour	2016 Existing				2023 No-Build				2023 Build			
	Demand ^a	Delay ^b	LOS ^c	Queue ^d Ave/95 th	Demand	Delay	LOS	Queue Ave/95 th	Demand	Delay	LOS	Queue Ave/95 th
<i>Harvard Street at Coolidge Street</i>												
<i>Weekday Morning:</i>												
Coolidge Street EB LT/TH/RT	40	18	C	~/18	43	20	C	~/15	43	20	C	~/15
Coolidge Street WB LT/TH/RT	15	19	C	~/5	16	20	C	~/5	16	20	C	~/5
Harvard Street NB LT	18	9	A	~/3	19	9	A	~/3	19	9	A	~/3
Harvard Street SB LT	15	9	A	~/0	16	9	A	~/3	16	9	A	~/3
<i>Weekday Evening:</i>												
Coolidge Street EB LT/TH/RT	31	20	C	~/13	33	23	C	~/13	33	23	C	~/13
Coolidge Street WB LT/TH/RT	15	18	C	~/5	16	20	C	~/5	16	20	C	~/5
Harvard Street NB LT	10	9	A	~/0	11	9	A	~/0	11	9	A	~/0
Harvard Street SB LT	12	9	A	~/0	13	9	A	~/0	13	9	A	~/0
<i>Fuller Street at Site Drive</i>												
<i>Weekday Morning:</i>												
Site Drive SB LT/RT	1	11	B	~/0	1	11	B	~/0	7	10	B	~/0
<i>Weekday Evening:</i>												
Site Drive SB LT/RT	2	9	A	~/0	2	9	A	~/0	6	10	A	~/0

^aDemand in vehicles per hour

^bDelay in seconds per vehicle.

^cLevel of service.

^dQueue length in feet for Average (50th percentile) and 95th percentile conditions.

EB = eastbound; WB = westbound; NB = northbound; SB = southbound; LT = left-turning movements; TH = thought movements; RT = right-turning movements

Table 9
SIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Signalized Intersection/ Peak Hour	2016 Existing				2023 No-Build				2023 Build			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d Ave/95 th	V/C	Delay	LOS	Queue Ave/95 th	V/C	Delay	LOS	Queue Ave/95 th
<i>Harvard Street at Fuller Street</i>												
<i>Weekday Morning:</i>												
Fuller Street EB LT/TH/RT	0.71	58	E	86/162	0.71	58	E	85/173	0.73	59	E	89/182
Fuller Street WB LT/TH/RT	0.31	39	D	50/65	0.26	38	D	34/73	0.26	38	D	34/73
Harvard Street NB LT	0.21	<5	A	16/27	0.20	<5	A	14/30	0.20	<5	A	14/31
Harvard Street NB TH/RT	0.36	<5	A	78/94	0.36	<5	A	77/117	0.36	<5	A	77/117
Harvard Street SB LT	0.01	<5	A	1/3	0.01	<5	A	1/3	0.01	<5	A	1/3
Harvard Street SB TH/RT	0.43	5	A	100/149	0.48	6	A	116/174	0.48	6	A	116/173
Overall	--	13	B	--	--	12	B	--	--	13	B	--
<i>Weekday Evening:</i>												
Fuller Street EB LT/TH/RT	0.60	51	D	64/120	0.64	53	D	71/132	0.65	53	D	73/141
Fuller Street WB LT/TH/RT	0.27	39	D	34/66	0.26	38	D	33/70	0.26	38	D	33/70
Harvard Street NB LT	0.04	<5	A	3/9	0.05	<5	A	3/9	0.05	<5	A	4/10
Harvard Street NB TH/RT	0.35	<5	A	75/114	0.39	<5	A	89/133	0.39	<5	A	89/133
Harvard Street SB LT	0.02	<5	A	1/5	0.02	<5	A	2/6	0.02	<5	A	2/6
Harvard Street SB TH/RT	0.38	<5	A	85/128	0.43	5	A	102/151	0.43	5	A	103/153
Overall	--	11	B	--	--	11	B	--	--	11	B	--

^aVolume to Capacity

^bDelay in seconds per vehicle.

^cLevel of service.

^dQueue length in feet for Average (50th percentile) and 95th percentile conditions.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to identify the traffic impacts associated with the proposed mixed-use development located at 420 Harvard Street in Brookline, Massachusetts. As currently proposed, the project will consist of the development of 36 apartment units and 2,650 sf of retail.

The project site is situated on the west side of Fuller Street and the south side of Harvard Street. Access to the project site will be provided by way of the existing driveway onto Fuller Street. Parking will be provided for 38 vehicles, 36 parking spaces will be accessed via the Fuller Street driveway and the other 2 parking spaces are existing parking spaces on Coolidge Street. Access for delivery and trash services will be provided on Coolidge Street at a designated loading zone.

This study was prepared in accordance with the Massachusetts Department of Transportation (MassDOT) Guidelines for Transportation Impact Assessments (TIAs), including MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. Based upon the results of this study, the following can be concluded:

- The Project was shown to generate approximately 109 vehicle trips on an average weekday (two-way, 24-hour volume, or 2 vehicles entering and 6 exiting), with approximately 8 vehicle trips (2 vehicles entering and 6 exiting) expected during the weekday morning peak-hour. During the weekday evening peak hour the Project is expected to generate approximately 10 vehicle trips (6 vehicles entering and 4 exiting).
- The Project is not projected to have a significant impact (increase) on motorist delays from the 2023 No-Build to the 2023 Build conditions.

Overall, the project can safely be accommodated in the area with the implementation of following recommendations.

RECOMMENDATIONS

A meeting was held with the Town of Brookline Engineering Department on July 7, 2016 to discuss the project. Based on those discussions, the following improvements have been recommended as a part of this evaluation to provide safe and efficient access to the project and address any deficiencies identified at off-site locations evaluated in conjunction with this study.

Site Access

Access to the Project site will be provided via an existing full access/egress driveway onto Fuller Street. Signs and landscaping adjacent to the Project driveways and within the Project site should be designed and maintained so as not to restrict lines of sight. In addition, all signs and pavement markings to be installed within the Project should conform to the specifications of the *Manual on Uniform Traffic Control Devices (MUTCD)*⁵.

Parking Summary

Surface parking should be provided on site which and accessed via Fuller Street. Two additional surface parking spaces that currently exist on Coolidge Street should also be available for resident/customer use. Additional below grade parking should be provided for residential/customer use. A total of 38 parking spaces should be provided, 2 located on Coolidge Street and 36 accessed via the Fuller Street site drive.

Transit/Bicycle

An indoor space will be dedicated as a Bike room and outdoor Bike racks should be installed on the property. A rate of approximately one Bike rack per unit should be considered. Transit schedules should be posted on site.

Delivery/Trash Services

Trash pick-up will be handled by a private service. Trash pick-up and delivery services will utilize a loading zone located on Coolidge Street. Loading will be permitted during business hour only, 9:00 AM to 5:00 PM.

With implementation of the above recommendations, safe and efficient access and egress will be provided and the planned development can be accommodated safely.

⁵*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C., 2009

APPENDIX

TRAFFIC COUNT DATA

SEASONAL ADJUSTMENT DATA

PUBLIC TRANSPORTATION SCHEDULES

MOTOR VEHICLE CRASH DATA

TRIP GENERATION CALCULATIONS

CAPACITY ANALYSIS

TRAFFIC COUNT DATA

Accurate Counts

978-664-2565

N/S Street : Harvard Street
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680002
 Site Code : 73680002
 Start Date : 7/19/2016
 Page No : 1

	Groups Printed- Cars - Trucks												
	Harvard St From North			Fuller St From East			Harvard St From South			Fuller St From West			Int. Total
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	1	69	8	1	2	3	13	59	0	10	4	7	177
07:15 AM	0	87	6	4	0	1	11	79	4	12	3	5	212
07:30 AM	1	87	10	0	2	0	11	75	0	17	3	10	216
07:45 AM	0	106	8	1	4	4	18	100	3	16	7	6	273
Total	2	349	32	6	8	8	53	313	7	55	17	28	878
08:00 AM	2	98	11	1	10	4	10	74	0	11	4	11	236
08:15 AM	1	118	15	1	9	5	38	111	0	21	4	10	333
08:30 AM	1	119	7	7	9	3	19	105	1	10	7	14	302
08:45 AM	1	133	10	2	4	0	22	83	0	18	8	12	293
Total	5	468	43	11	32	12	89	373	1	60	23	47	1164
Grand Total	7	817	75	17	40	20	142	686	8	115	40	75	2042
Apprch %	0.8	90.9	8.3	22.1	51.9	26	17	82.1	1	50	17.4	32.6	
Total %	0.3	40	3.7	0.8	2	1	7	33.6	0.4	5.6	2	3.7	
Cars	7	778	75	17	40	19	138	653	8	113	40	73	1961
% Cars	100	95.2	100	100	100	95	97.2	95.2	100	98.3	100	97.3	96
Trucks	0	39	0	0	0	1	4	33	0	2	0	2	81
% Trucks	0	4.8	0	0	0	5	2.8	4.8	0	1.7	0	2.7	4

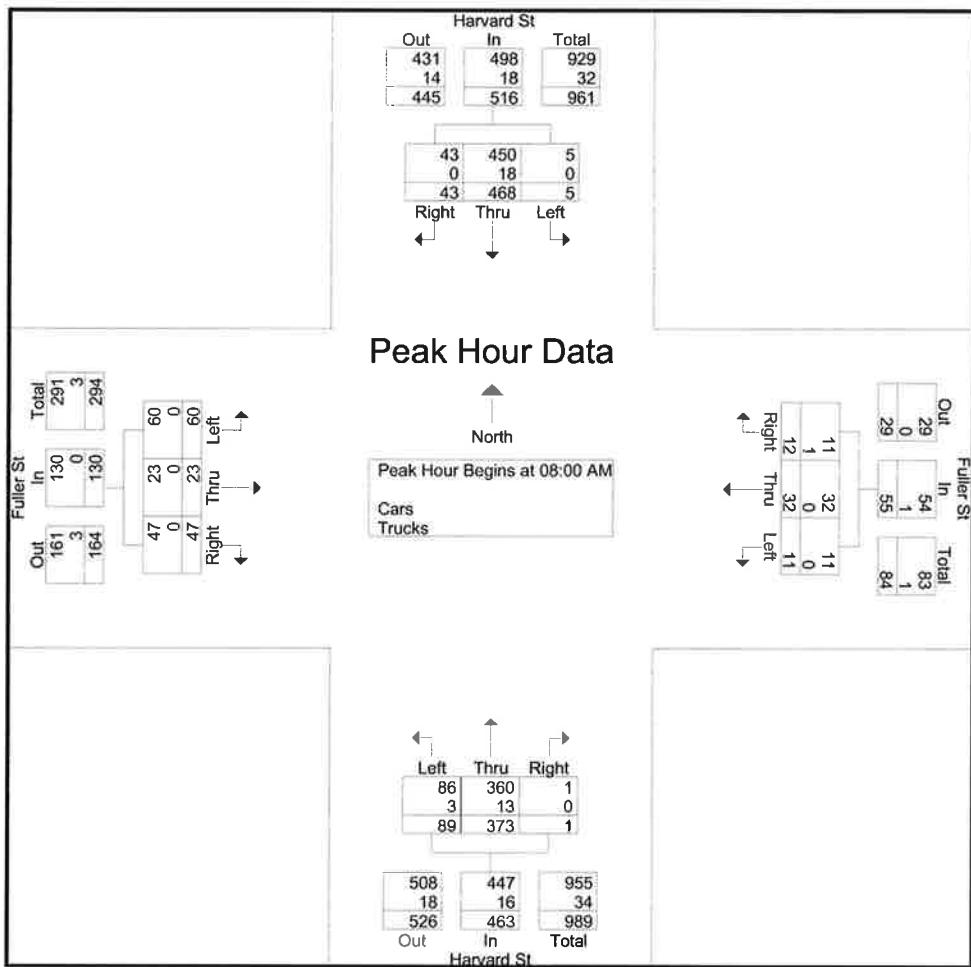
Accurate Counts

978-664-2565

N/S Street : Harvard Street
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680002
 Site Code : 73680002
 Start Date : 7/19/2016
 Page No : 2

Start Time	Harvard St				Fuller St				Harvard St				Fuller St				
	From North		From East		From South		From West										
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	2	98	11	111	1	10	4	15	10	74	0	84	11	4	11	26	236
08:15 AM	1	118	15	134	1	9	5	15	38	111	0	149	21	4	10	35	333
08:30 AM	1	119	7	127	7	9	3	19	19	105	1	125	10	7	14	31	302
08:45 AM	1	133	10	144	2	4	0	6	22	83	0	105	18	8	12	38	293
Total Volume	5	468	43	516	11	32	12	55	89	373	1	463	60	23	47	130	1164
% App. Total	1	90.7	8.3		20	58.2	21.8		19.2	80.6	0.2		46.2	17.7	36.2		
PHF	.625	.880	.717	.896	.393	.800	.600	.724	.586	.840	.250	.777	.714	.719	.839	.855	.874
Cars	5	450	43	498	11	32	11	54	86	360	1	447	60	23	47	130	1129
% Cars	100	96.2	100	96.5	100	100	91.7	98.2	96.6	96.5	100	96.5	100	100	100	100	97.0
Trucks	0	18	0	18	0	0	1	1	3	13	0	16	0	0	0	0	35
% Trucks	0	3.8	0	3.5	0	0	8.3	1.8	3.4	3.5	0	3.5	0	0	0	0	3.0



Accurate Counts
978-664-2565

N/S Street : Harvard Street
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680002
 Site Code : 73680002
 Start Date : 7/19/2016
 Page No : 7

Groups Printed- Trucks

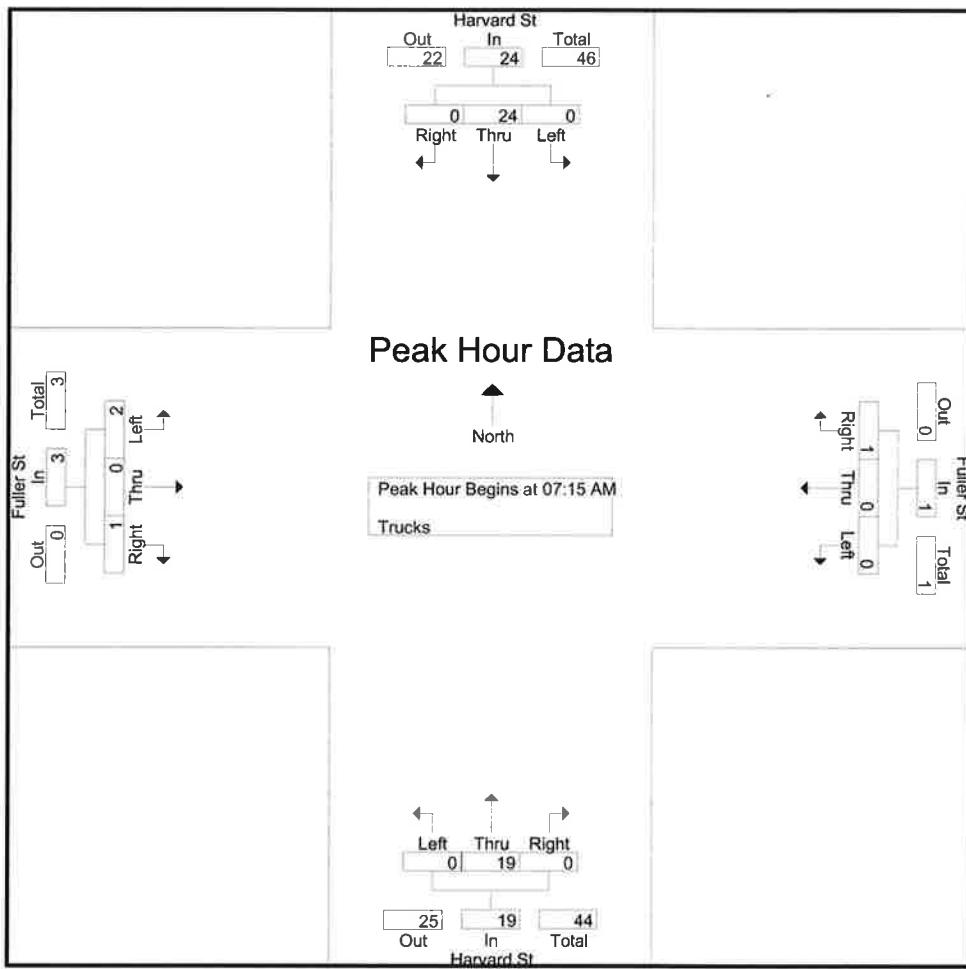
Start Time	Harvard St From North			Fuller St From East			Harvard St From South			Fuller St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	4	0	0	0	0	1	3	0	0	0	1	9
07:15 AM	0	6	0	0	0	0	0	5	0	1	0	0	12
07:30 AM	0	3	0	0	0	0	0	6	0	0	0	1	10
07:45 AM	0	8	0	0	0	0	0	6	0	1	0	0	15
Total	0	21	0	0	0	0	1	20	0	2	0	2	46
08:00 AM	0	7	0	0	0	1	0	2	0	0	0	0	10
08:15 AM	0	3	0	0	0	0	0	3	0	0	0	0	6
08:30 AM	0	1	0	0	0	0	3	4	0	0	0	0	8
08:45 AM	0	7	0	0	0	0	0	4	0	0	0	0	11
Total	0	18	0	0	0	1	3	13	0	0	0	0	35
Grand Total	0	39	0	0	0	1	4	33	0	2	0	2	81
Apprch %	0	100	0	0	0	100	10.8	89.2	0	50	0	50	
Total %	0	48.1	0	0	0	1.2	4.9	40.7	0	2.5	0	2.5	

Accurate Counts
978-664-2565

N/S Street : Harvard Street
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File Name : 73680002
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Start Date : 7/19/2016
Page No : 8

Start Time	Harvard St				Fuller St				Harvard St				Fuller St				
	From North				From East				From South				From West				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	6	0	6	0	0	0	0	0	5	0	5	1	0	0	1	12
07:30 AM	0	3	0	3	0	0	0	0	0	6	0	6	0	0	1	1	10
07:45 AM	0	8	0	8	0	0	0	0	0	6	0	6	1	0	0	1	15
08:00 AM	0	7	0	7	0	0	1	1	0	2	0	2	0	0	0	0	10
Total Volume	0	24	0	24	0	0	1	1	0	19	0	19	2	0	1	3	47
% App. Total	0	100	0		0	0	100		0	100	0		66.7	0	33.3		
PHF	.000	.750	.000	.750	.000	.000	.250	.250	.000	.792	.000	.792	.500	.000	.250	.750	.783



Accurate Counts
978-664-2565

N/S Street : Harvard Street
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Weather : Clear

File Name : 73680002
Site Code : 73680002
Start Date : 7/19/2016
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Groups Printed- Cars - Trucks

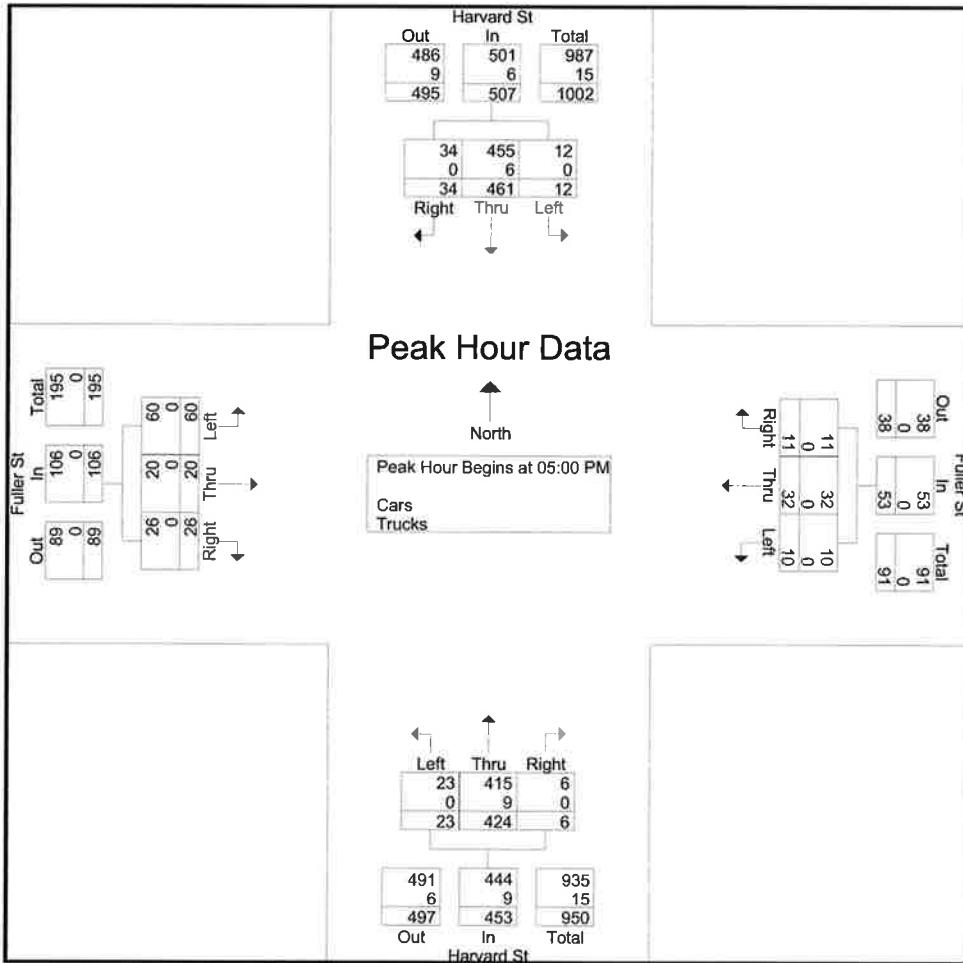
Start Time	Harvard St From North			Fuller St From East			Harvard St From South			Fuller St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	1	113	13	6	5	4	9	118	2	9	5	6	291
04:15 PM	3	93	4	2	3	2	14	98	2	10	5	8	244
04:30 PM	1	104	8	2	7	1	4	103	0	18	3	14	265
04:45 PM	1	104	9	1	6	2	6	81	1	13	4	7	235
Total	6	414	34	11	21	9	33	400	5	50	17	35	1035
05:00 PM	5	108	6	0	9	2	7	107	2	15	5	5	271
05:15 PM	1	115	12	2	8	4	8	114	2	17	4	5	292
05:30 PM	3	122	7	3	6	3	4	108	0	12	6	9	283
05:45 PM	3	116	9	5	9	2	4	95	2	16	5	7	273
Total	12	461	34	10	32	11	23	424	6	60	20	26	1119
Grand Total	18	875	68	21	53	20	56	824	11	110	37	61	2154
Apprch %	1.9	91.1	7.1	22.3	56.4	21.3	6.3	92.5	1.2	52.9	17.8	29.3	
Total %	0.8	40.6	3.2	1	2.5	0.9	2.6	38.3	0.5	5.1	1.7	2.8	
Cars	18	858	68	21	53	20	56	805	11	110	37	59	2116
% Cars	100	98.1	100	100	100	100	100	97.7	100	100	100	96.7	98.2
Trucks	0	17	0	0	0	0	0	19	0	0	0	2	38
% Trucks	0	1.9	0	0	0	0	0	2.3	0	0	0	3.3	1.8

Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Fuller Street
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Weather : Clear

File Name : 73680002
Site Code : 73680002
Start Date : 7/19/2016
Page No : 2

Start Time	Harvard St				Fuller St				Harvard St				Fuller St				
	From North		From East		From South		From West										
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	5	108	6	119	0	9	2	11	7	107	2	116	15	5	5	25	271
05:15 PM	1	115	12	128	2	8	4	14	8	114	2	124	17	4	5	26	292
05:30 PM	3	122	7	132	3	6	3	12	4	108	0	112	12	6	9	27	283
05:45 PM	3	116	9	128	5	9	2	16	4	95	2	101	16	5	7	28	273
Total Volume	12	461	34	507	10	32	11	53	23	424	6	453	60	20	26	106	1119
% App. Total	2.4	90.9	6.7		18.9	60.4	20.8		5.1	93.6	1.3		56.6	18.9	24.5		
PHF	.600	.945	.708	.960	.500	.889	.688	.828	.719	.930	.750	.913	.882	.833	.722	.946	.958
Cars	12	455	34	501	10	32	11	53	23	415	6	444	60	20	26	106	1104
% Cars	100	98.7	100	98.8	100	100	100	100	100	97.9	100	98.0	100	100	100	100	98.7
Trucks	0	6	0	6	0	0	0	0	0	0	9	0	0	0	0	0	15
% Trucks	0	1.3	0	1.2	0	0	0	0	0	2.1	0	2.0	0	0	0	0	1.3



Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Fuller Street
City/State : Brookline, MA
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File Name : 73680002
Site Code : 73680002
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Groups Printed- Trucks

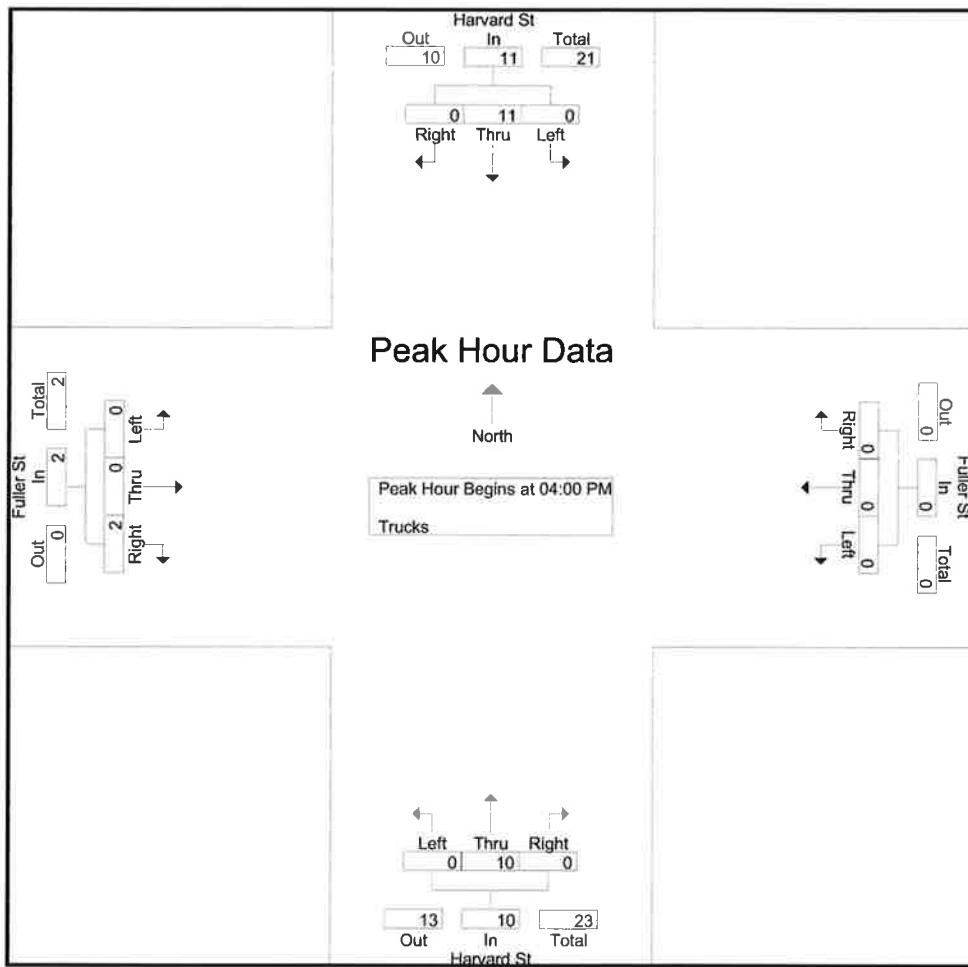
Start Time	Harvard St From North			Fuller St From East			Harvard St From South			Fuller St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	4	0	0	0	0	0	2	0	0	0	1	7
04:15 PM	0	1	0	0	0	0	0	3	0	0	0	1	5
04:30 PM	0	3	0	0	0	0	0	2	0	0	0	0	5
04:45 PM	0	3	0	0	0	0	0	3	0	0	0	0	6
Total	0	11	0	0	0	0	0	10	0	0	0	2	23
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	3	0	0	0	0	0	3	0	0	0	0	6
05:30 PM	0	0	0	0	0	0	0	5	0	0	0	0	5
05:45 PM	0	3	0	0	0	0	0	1	0	0	0	0	4
Total	0	6	0	0	0	0	0	9	0	0	0	0	15
Grand Total	0	17	0	0	0	0	0	19	0	0	0	2	38
Apprch %	0	100	0	0	0	0	0	100	0	0	0	100	
Total %	0	44.7	0	0	0	0	0	50	0	0	0	5.3	

Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Fuller Street
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File Name : 73680002
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Start Time	Harvard St				Fuller St				Harvard St				Fuller St				
	From North				From East				From South				From West				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	4	0	4	0	0	0	0	0	2	0	2	0	0	1	1	7
04:15 PM	0	1	0	1	0	0	0	0	0	3	0	3	0	0	1	1	5
04:30 PM	0	3	0	3	0	0	0	0	0	2	0	2	0	0	0	0	5
04:45 PM	0	3	0	3	0	0	0	0	0	3	0	3	0	0	0	0	6
Total Volume	0	11	0	11	0	0	0	0	0	10	0	10	0	0	2	2	23
% App. Total	0	100	0		0	0	0		0	100	0		0	0	100		
PHF	.000	.688	.000	.688	.000	.000	.000	.000	.000	.833	.000	.833	.000	.000	.500	.500	.821



Accurate Counts

978-664-2565

N/S Street : Harvard Street
 E/W Street : Coolidge Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680001
 Site Code : 73680001
 Start Date : 7/19/2016
 Page No : 1

Groups Printed- Cars - Trucks

Start Time	Harvard St From North			Coolidge St From East			Harvard St From South			Coolidge St From West			Int. Total
	Left	Thru	Right										
07:00 AM	2	83	0	0	0	0	3	71	1	1	0	1	162
07:15 AM	0	88	1	0	0	1	2	86	1	2	1	1	183
07:30 AM	2	97	0	0	0	1	4	93	1	3	1	0	202
07:45 AM	2	112	1	1	0	3	2	106	1	3	2	2	235
Total	6	380	2	1	0	5	11	356	4	9	4	4	782
08:00 AM	2	105	1	1	2	2	1	89	3	1	2	5	214
08:15 AM	4	130	2	1	0	1	9	115	4	2	2	4	274
08:30 AM	2	114	1	0	0	4	3	116	1	0	5	10	256
08:45 AM	7	124	1	1	2	1	5	97	1	1	1	6	247
Total	15	473	5	3	4	8	18	417	9	4	10	25	991
Grand Total	21	853	7	4	4	13	29	773	13	13	14	29	1773
Apprch %	2.4	96.8	0.8	19	19	61.9	3.6	94.8	1.6	23.2	25	51.8	
Total %	1.2	48.1	0.4	0.2	0.2	0.7	1.6	43.6	0.7	0.7	0.8	1.6	
Cars	20	820	7	4	4	13	28	738	13	13	14	28	1702
% Cars	95.2	96.1	100	100	100	100	96.6	95.5	100	100	100	96.6	96
Trucks	1	33	0	0	0	0	1	35	0	0	0	1	71
% Trucks	4.8	3.9	0	0	0	0	3.4	4.5	0	0	0	3.4	4

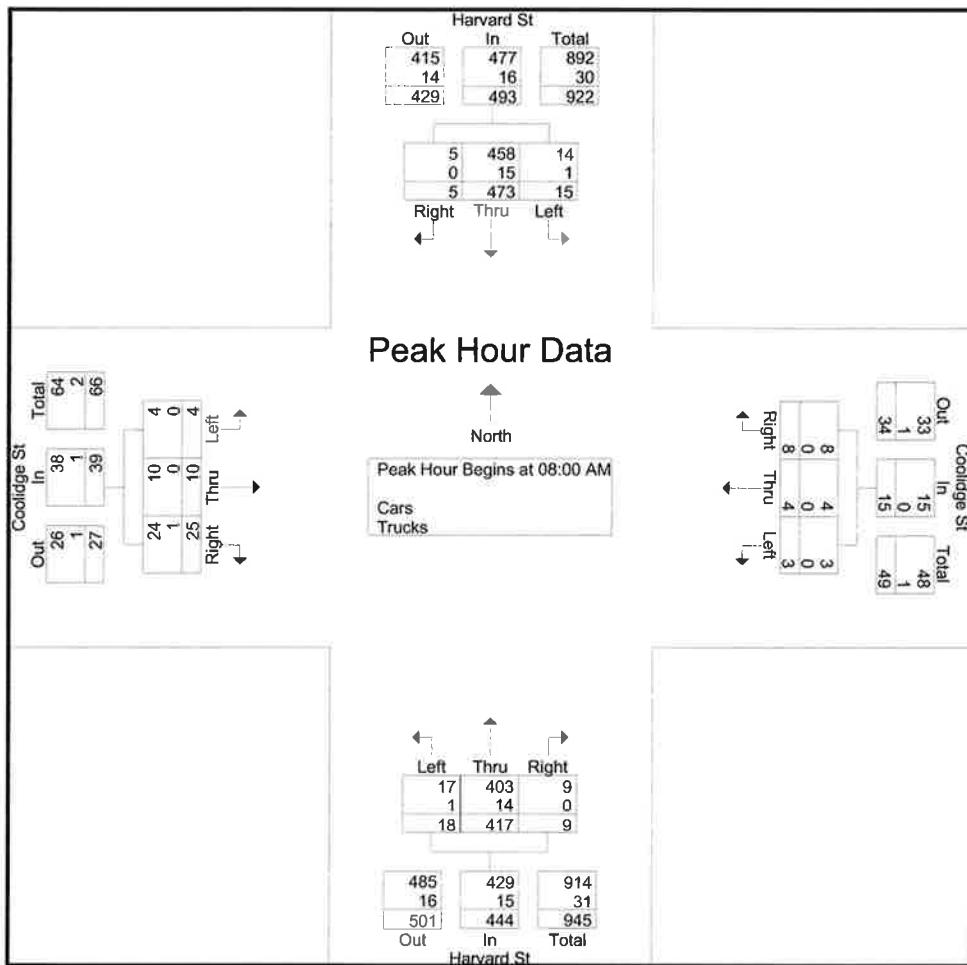
Accurate Counts

978-664-2565

N/S Street : Harvard Street
E/W Street : Coolidge Street
City/State : Brookline, MA
Weather : Clear

File Name : 73680001
Site Code : 73680001
Start Date : 7/19/2016
Page No : 2

	Harvard St				Coolidge St				Harvard St				Coolidge St				
	From North				From East				From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	2	105	1	108	1	2	2	5	1	89	3	93	1	2	5	8	214
08:15 AM	4	130	2	136	1	0	1	2	9	115	4	128	2	2	4	8	274
08:30 AM	2	114	1	117	0	0	4	4	3	116	1	120	0	5	10	15	256
08:45 AM	7	124	1	132	1	2	1	4	5	97	1	103	1	1	6	8	247
Total Volume	15	473	5	493	3	4	8	15	18	417	9	444	4	10	25	39	991
% App. Total	3	95.9	1		20	26.7	53.3		4.1	93.9	2		10.3	25.6	64.1		
PHF	.536	.910	.625	.906	.750	.500	.500	.750	.500	.899	.563	.867	.500	.500	.625	.650	.904
Cars	14	458	5	477	3	4	8	15	17	403	9	429	4	10	24	38	959
% Cars	93.3	96.8	100	96.8	100	100	100	100	94.4	96.6	100	96.6	100	100	96.0	97.4	96.8
Trucks	1	15	0	16	0	0	0	0	0	14	0	15	0	0	1	1	32
% Trucks	6.7	3.2	0	3.2	0	0	0	0	5.6	3.4	0	3.4	0	0	4.0	2.6	3.2



Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Coolidge Street
City/State : Brookline, MA
Weather : Clear

File Name : 73680001
Site Code : 73680001
Start Date : 7/19/2016
Page No : 7

Groups Printed- Trucks

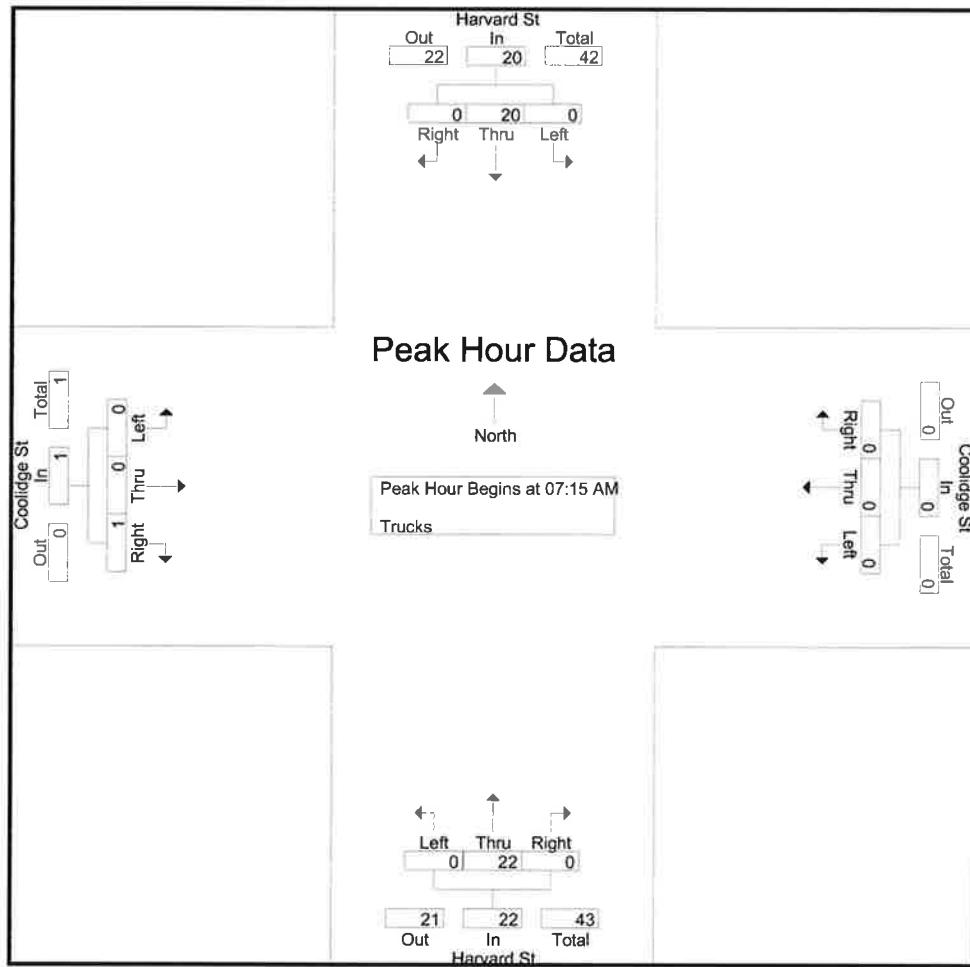
Start Time	Harvard St From North			Coolidge St From East			Harvard St From South			Coolidge St From West			Int. Total
	Left	Thru	Right										
07:00 AM	0	3	0	0	0	0	0	3	0	0	0	0	6
07:15 AM	0	5	0	0	0	0	0	5	0	0	0	0	10
07:30 AM	0	3	0	0	0	0	0	6	0	0	0	0	9
07:45 AM	0	7	0	0	0	0	0	7	0	0	0	0	14
Total	0	18	0	0	0	0	0	21	0	0	0	0	39
08:00 AM	0	5	0	0	0	0	0	4	0	0	0	0	10
08:15 AM	0	3	0	0	0	0	1	2	0	0	0	0	6
08:30 AM	0	1	0	0	0	0	0	4	0	0	0	0	5
08:45 AM	1	6	0	0	0	0	0	4	0	0	0	0	11
Total	1	15	0	0	0	0	1	14	0	0	0	1	32
Grand Total	1	33	0	0	0	0	1	35	0	0	0	0	71
Apprch %	2.9	97.1	0	0	0	0	2.8	97.2	0	0	0	0	100
Total %	1.4	46.5	0	0	0	0	1.4	49.3	0	0	0	1.4	

Accurate Counts
978-664-2565

N/S Street : Harvard Street
 E/W Street : Coolidge Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680001
 Site Code : 73680001
 Start Date : 7/19/2016
 Page No : 8

Start Time	Harvard St				Coolidge St				Harvard St				Coolidge St				
	From North				From East				From South				From West				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	5	0	5	0	0	0	0	0	5	0	5	0	0	0	0	10
07:30 AM	0	3	0	3	0	0	0	0	0	6	0	6	0	0	0	0	9
07:45 AM	0	7	0	7	0	0	0	0	0	7	0	7	0	0	0	0	14
08:00 AM	0	5	0	5	0	0	0	0	0	4	0	4	0	0	1	1	10
Total Volume	0	20	0	20	0	0	0	0	0	22	0	22	0	0	1	1	43
% App. Total	0	100	0	0	0	0	0	0	0	100	0	0	0	0	100	0	0
PHF	.000	.714	.000	.714	.000	.000	.000	.000	.000	.786	.000	.786	.000	.000	.250	.250	.768



Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Coolidge Street
City/State : Brookline, MA
Weather : Clear

File Name : 73680001
Site Code : 73680001
Start Date : 7/19/2016
Page No : 1

Groups Printed- Cars - Trucks

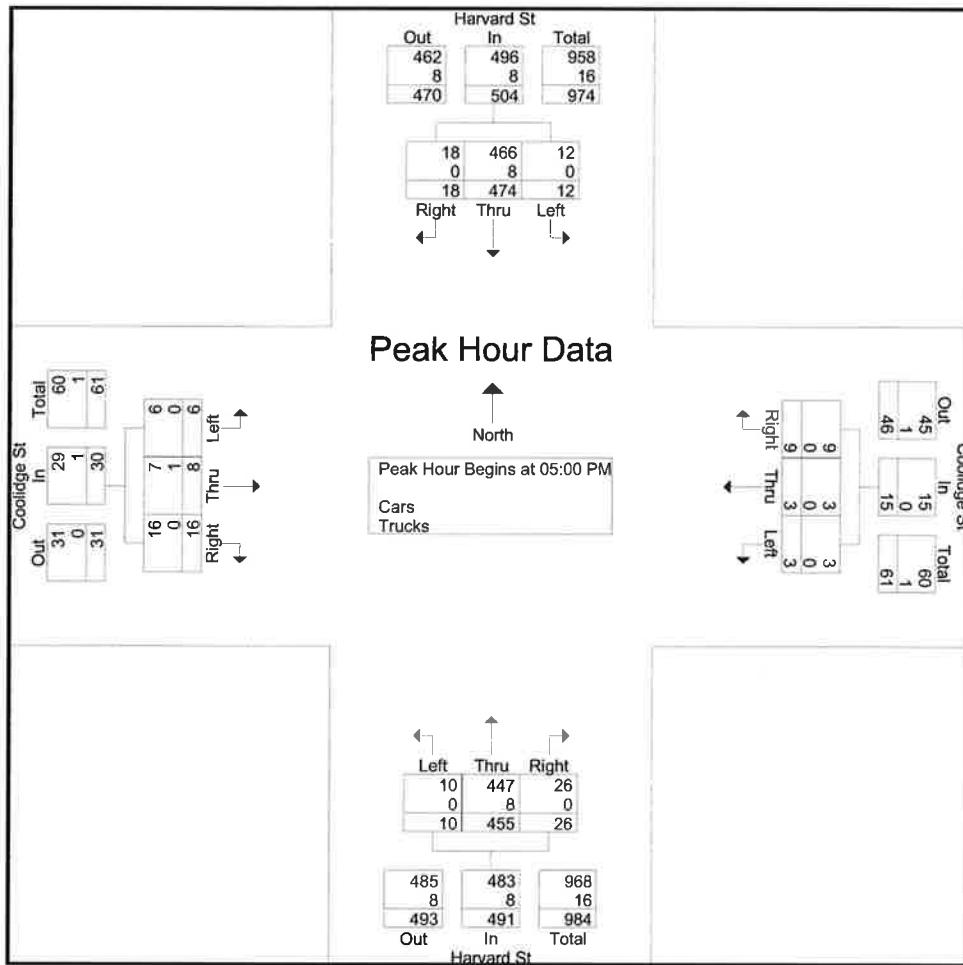
Start Time	Harvard St From North			Coolidge St From East			Harvard St From South			Coolidge St From West			Int. Total
	Left	Thru	Right										
04:00 PM	1	118	4	0	1	1	3	117	1	0	1	2	249
04:15 PM	2	97	3	0	0	2	5	96	5	4	1	2	217
04:30 PM	4	107	5	1	2	2	4	114	2	1	1	4	247
04:45 PM	1	113	0	0	0	0	2	92	2	1	0	7	218
Total	8	435	12	1	3	5	14	419	10	6	3	15	931
05:00 PM	4	114	5	1	1	3	0	123	4	1	2	2	260
05:15 PM	3	127	7	0	1	2	1	125	6	2	2	2	278
05:30 PM	0	123	3	1	1	3	5	109	10	1	1	7	264
05:45 PM	5	110	3	1	0	1	4	98	6	2	3	5	238
Total	12	474	18	3	3	9	10	455	26	6	8	16	1040
Grand Total	20	909	30	4	6	14	24	874	36	12	11	31	1971
Apprch %	2.1	94.8	3.1	16.7	25	58.3	2.6	93.6	3.9	22.2	20.4	57.4	
Total %	1	46.1	1.5	0.2	0.3	0.7	1.2	44.3	1.8	0.6	0.6	1.6	
Cars	19	893	30	4	6	14	24	856	36	12	10	30	1934
% Cars	95	98.2	100	100	100	100	100	97.9	100	100	90.9	96.8	98.1
Trucks	1	16	0	0	0	0	0	18	0	0	1	1	37
% Trucks	5	1.8	0	0	0	0	0	2.1	0	0	9.1	3.2	1.9

Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Coolidge Street
City/State : Brookline, MA
Weather : Clear

File Name : 73680001
Site Code : 73680001
Start Date : 7/19/2016
Page No : 2

Start Time	Harvard St				Coolidge St				Harvard St				Coolidge St				
	From North				From East				From South				From West				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	4	114	5	123	1	1	3	5	0	123	4	127	1	2	2	5	260
05:15 PM	3	127	7	137	0	1	2	3	1	125	6	132	2	2	2	6	278
05:30 PM	0	123	3	126	1	1	3	5	5	109	10	124	1	1	7	9	264
05:45 PM	5	110	3	118	1	0	1	2	4	98	6	108	2	3	5	10	238
Total Volume	12	474	18	504	3	3	9	15	10	455	26	491	6	8	16	30	1040
% App. Total	2.4	94	3.6		20	20	60		2	92.7	5.3		20	26.7	53.3		
PHF	.600	.933	.643	.920	.750	.750	.750	.750	.500	.910	.650	.930	.750	.667	.571	.750	.935
Cars	12	466	18	496	3	3	9	15	10	447	26	483	6	7	16	29	1023
% Cars	100	98.3	100	98.4	100	100	100	100	100	98.2	100	98.4	100	87.5	100	96.7	98.4
Trucks	0	8	0	8	0	0	0	0	0	8	0	8	0	1	0	1	17
% Trucks	0	1.7	0	1.6	0	0	0	0	0	1.8	0	1.6	0	12.5	0	3.3	1.6



Accurate Counts

978-664-2565

N/S Street : Harvard Street
 E/W Street : Coolidge Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680001
 Site Code : 73680001
 Start Date : 7/19/2016
 Page No : 7

Groups Printed- Trucks

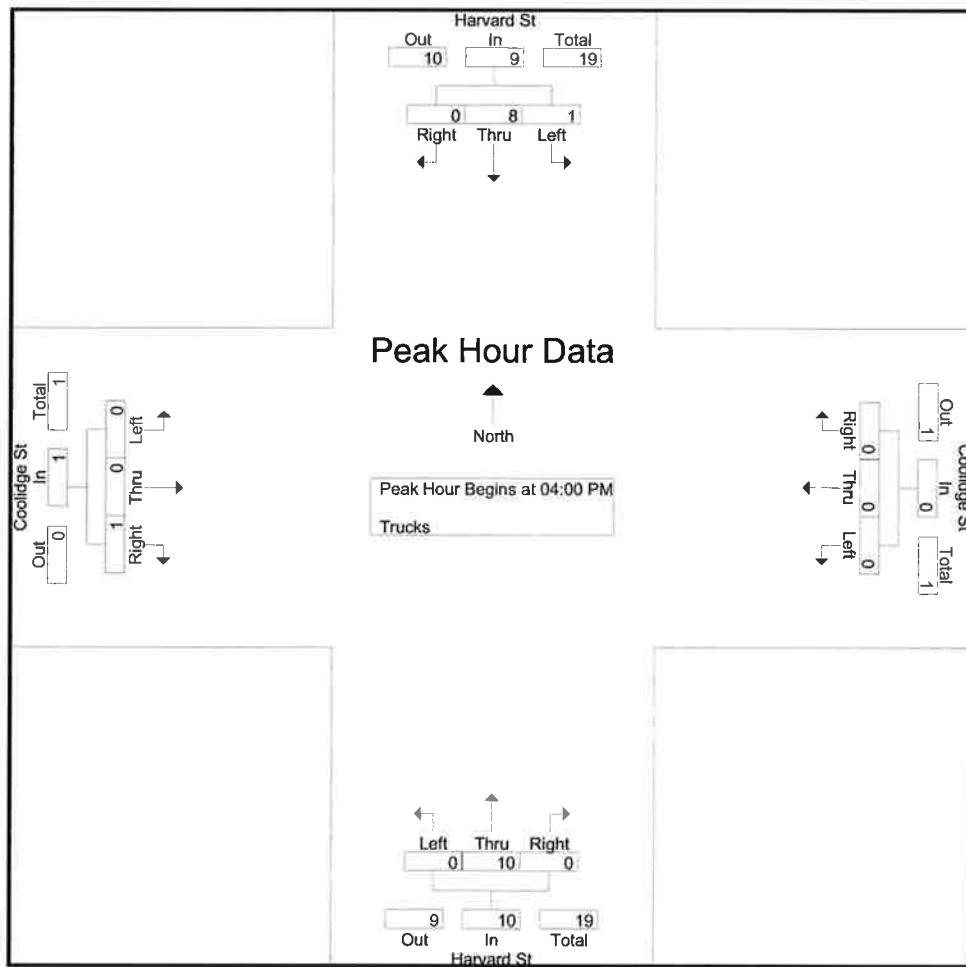
Start Time	Harvard St From North			Coolidge St From East			Harvard St From South			Coolidge St From West			Int. Total
	Left	Thru	Right										
04:00 PM	0	2	0	0	0	0	0	2	0	0	0	0	4
04:15 PM	0	1	0	0	0	0	0	3	0	0	0	0	4
04:30 PM	1	3	0	0	0	0	0	2	0	0	0	1	7
04:45 PM	0	2	0	0	0	0	0	3	0	0	0	0	5
Total	1	8	0	0	0	0	0	10	0	0	0	1	20
05:00 PM	0	1	0	0	0	0	0	0	0	0	1	0	2
05:15 PM	0	3	0	0	0	0	0	2	0	0	0	0	5
05:30 PM	0	1	0	0	0	0	0	5	0	0	0	0	6
05:45 PM	0	3	0	0	0	0	0	1	0	0	0	0	4
Total	0	8	0	0	0	0	0	8	0	0	1	0	17
Grand Total	1	16	0	0	0	0	0	18	0	0	1	1	37
Apprch %	5.9	94.1	0	0	0	0	0	100	0	0	50	50	
Total %	2.7	43.2	0	0	0	0	0	48.6	0	0	2.7	2.7	

Accurate Counts
978-664-2565

N/S Street : Harvard Street
E/W Street : Coolidge Street
City/State : Brookline, MA
Weather : Clear

File Name : 73680001
Site Code : 73680001
Start Date : 7/19/2016
Page No : 8

	Harvard St				Coolidge St				Harvard St				Coolidge St				
	From North				From East				From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM To 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	2	0	2	0	0	0	0	0	2	0	2	0	0	0	0	4
04:15 PM	0	1	0	1	0	0	0	0	0	3	0	3	0	0	0	0	4
04:30 PM	1	3	0	4	0	0	0	0	0	2	0	2	0	0	1	1	7
04:45 PM	0	2	0	2	0	0	0	0	0	3	0	3	0	0	0	0	5
Total Volume	1	8	0	9	0	0	0	0	0	10	0	10	0	0	1	1	20
% App. Total	11.1	88.9	0		0	0	0		0	100	0		0	0	100		
PHF	.250	.667	.000	.563	.000	.000	.000	.000	.000	.833	.000	.833	.000	.250	.250	.714	



Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 1

Groups Printed- Cars - Trucks

	Parking Lot From North		Fuller St From East		Fuller St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
Start Time							
07:00 AM	0	0	23	0	0	20	43
07:15 AM	1	0	16	1	0	20	38
07:30 AM	0	0	23	0	0	27	50
07:45 AM	0	0	29	0	1	29	59
Total	1	0	91	1	1	96	190
08:00 AM	0	0	32	0	0	25	57
08:15 AM	0	0	59	0	0	35	94
08:30 AM	0	0	35	0	0	30	65
08:45 AM	1	0	32	0	1	38	72
Total	1	0	158	0	1	128	288
Grand Total	2	0	249	1	2	224	478
Apprch %	100	0	99.6	0.4	0.9	99.1	
Total %	0.4	0	52.1	0.2	0.4	46.9	
Cars	2	0	246	1	2	221	472
% Cars	100	0	98.8	100	100	98.7	98.7
Trucks	0	0	3	0	0	3	6
% Trucks	0	0	1.2	0	0	1.3	1.3

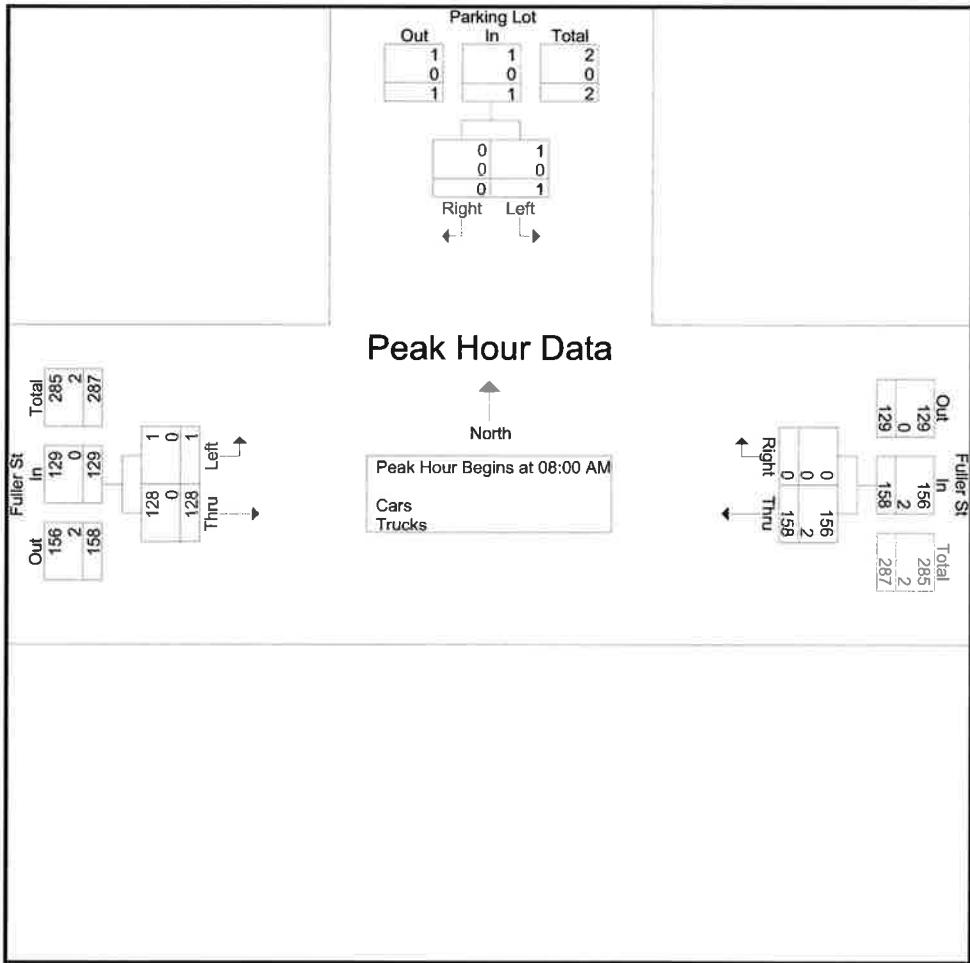
Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 2

	Parking Lot				Fuller St				Fuller St			
	From North			From East	From West							
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total		
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 08:00 AM												
08:00 AM	0	0	0	32	0	32	0	25	25	57		
08:15 AM	0	0	0	59	0	59	0	35	35	94		
08:30 AM	0	0	0	35	0	35	0	30	30	65		
08:45 AM	1	0	1	32	0	32	1	38	39	72		
Total Volume	1	0	1	158	0	158	1	128	129	288		
% App. Total	100	0		100	0		0.8	99.2				
PHF	.250	.000	.250	.669	.000	.669	.250	.842	.827	.766		
Cars	1	0	1	156	0	156	1	128	129	286		
% Cars	100	0	100	98.7	0	98.7	100	100	100	99.3		
Trucks	0	0	0	2	0	2	0	0	0	2		
% Trucks	0	0	0	1.3	0	1.3	0	0	0	0.7		



Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 7

Groups Printed- Trucks

Start Time	Parking Lot From North		Fuller St From East		Fuller St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
07:00 AM	0	0	1	0	0	0	1
07:15 AM	0	0	0	0	0	1	1
07:30 AM	0	0	0	0	0	1	1
07:45 AM	0	0	0	0	0	1	1
Total	0	0	1	0	0	3	4
08:00 AM	0	0	0	0	0	0	0
08:15 AM	0	0	1	0	0	0	1
08:30 AM	0	0	1	0	0	0	1
08:45 AM	0	0	0	0	0	0	0
Total	0	0	2	0	0	0	2
Grand Total	0	0	3	0	0	3	6
Apprch %	0	0	100	0	0	100	
Total %	0	0	50	0	0	50	

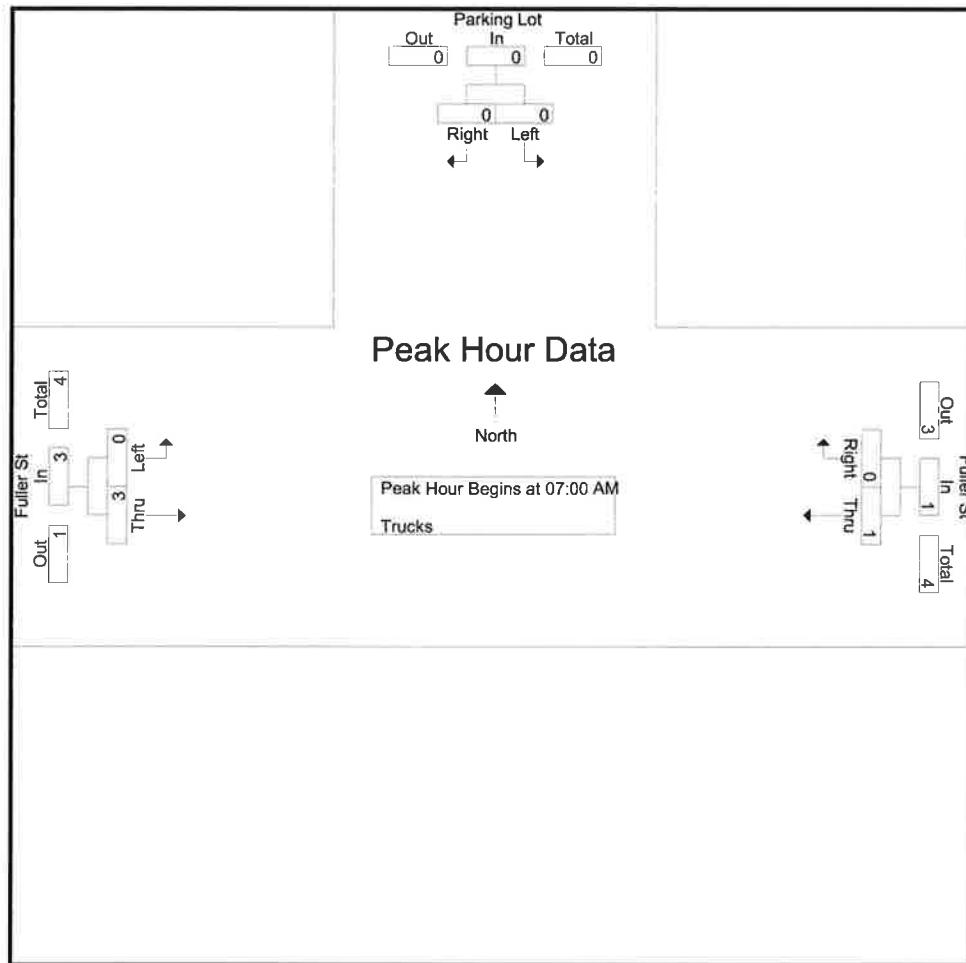
Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 8

	Parking Lot				Fuller St				Fuller St			
	From North				From East				From West			
Start Time	Left	Right	App. Total		Thru	Right	App. Total		Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 07:00 AM												
07:00 AM	0	0	0		1	0	1		0	0	0	1
07:15 AM	0	0	0		0	0	0		0	1	1	1
07:30 AM	0	0	0		0	0	0		0	1	1	1
07:45 AM	0	0	0		0	0	0		0	1	1	1
Total Volume	0	0	0		1	0	1		0	3	3	4
% App. Total	0	0			100	0			0	100		
PHF	.000	.000	.000		.250	.000	.250		.000	.750	.750	1.00



Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 1

Groups Printed- Cars - Trucks

	Parking Lot From North		Fuller St From East		Fuller St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
Start Time							
04:00 PM	0	2	22	0	0	19	43
04:15 PM	0	0	20	1	0	23	44
04:30 PM	0	0	18	0	0	37	55
04:45 PM	0	1	19	0	0	22	42
Total	0	3	79	1	0	101	184
05:00 PM	1	0	21	0	0	27	49
05:15 PM	0	0	29	0	0	26	55
05:30 PM	1	1	14	0	0	25	41
05:45 PM	0	2	20	0	0	27	49
Total	2	3	84	0	0	105	194
Grand Total	2	6	163	1	0	206	378
Apprch %	25	75	99.4	0.6	0	100	
Total %	0.5	1.6	43.1	0.3	0	54.5	
Cars	2	6	163	1	0	205	377
% Cars	100	100	100	100	0	99.5	99.7
Trucks	0	0	0	0	0	1	1
% Trucks	0	0	0	0	0	0.5	0.3

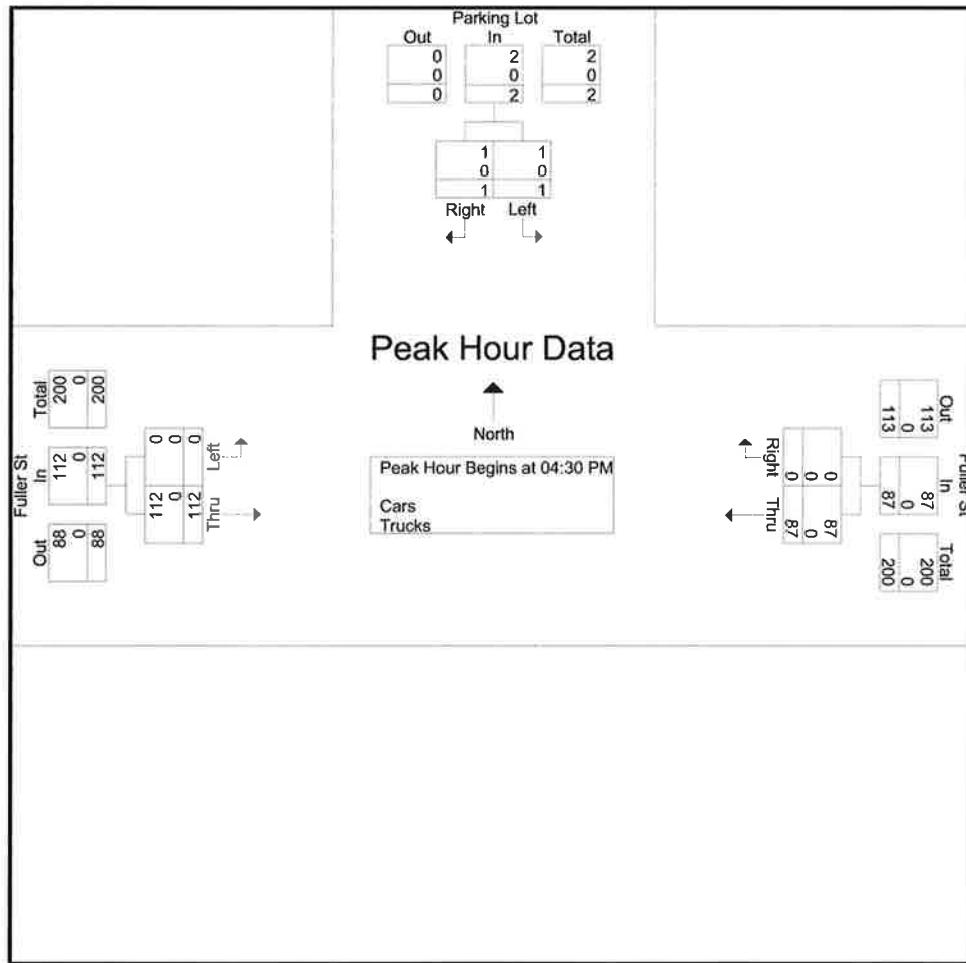
Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 2

	Parking Lot From North				Fuller St From East			Fuller St From West			
Start Time	Left	Right	App. Total		Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 04:30 PM											
04:30 PM	0	0	0		18	0	18	0	37	37	55
04:45 PM	0	1	1		19	0	19	0	22	22	42
05:00 PM	1	0	1		21	0	21	0	27	27	49
05:15 PM	0	0	0		29	0	29	0	26	26	55
Total Volume	1	1	2		87	0	87	0	112	112	201
% App. Total	50	50			100	0		0	100		
PHF	.250	.250	.500		.750	.000	.750	.000	.757	.757	.914
Cars	1	1	2		87	0	87	0	112	112	201
% Cars	100	100	100		100	0	100	0	100	100	100
Trucks	0	0	0		0	0	0	0	0	0	0
% Trucks	0	0	0		0	0	0	0	0	0	0



Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 7

Groups Printed- Trucks

Start Time	Parking Lot From North		Fuller St From East		Fuller St From West		Int. Total
	Left	Right	Thru	Right	Left	Thru	
04:00 PM	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	1	1
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	1
05:00 PM	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	1	1
Apprch %	0	0	0	0	0	100	100
Total %	0	0	0	0	0	100	100

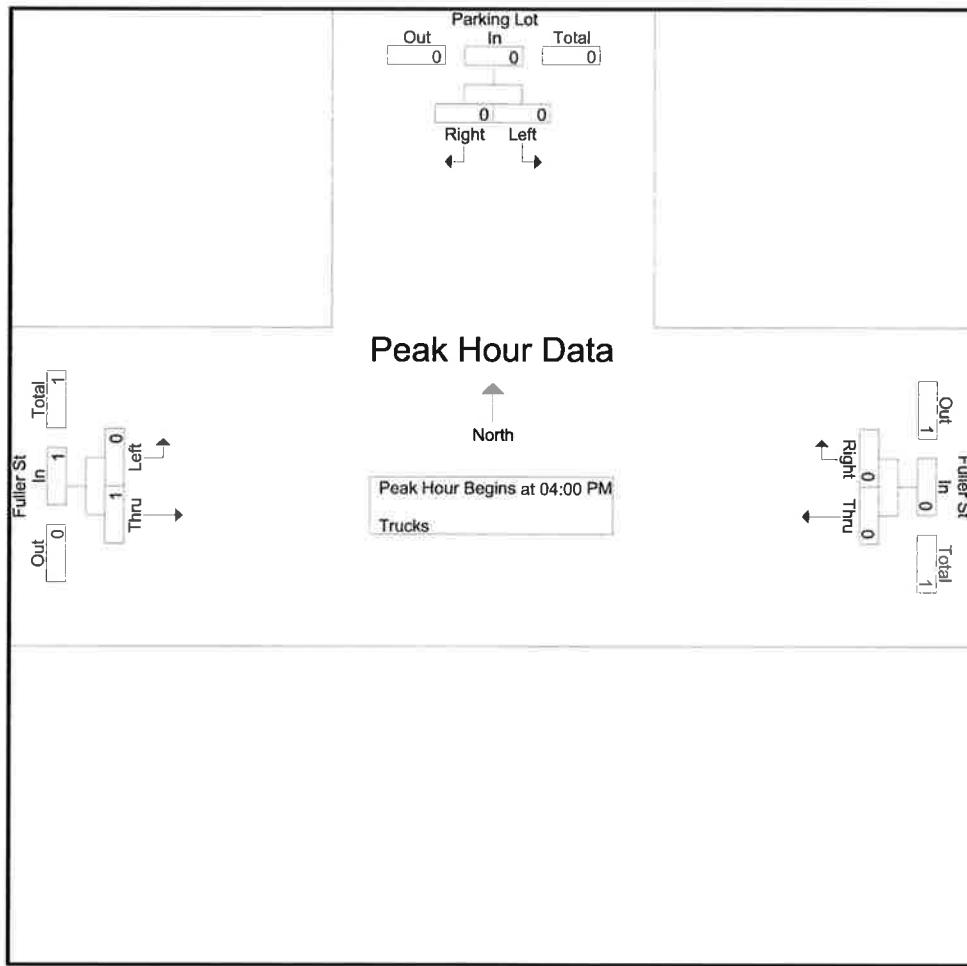
Accurate Counts

978-664-2565

N/S Street : Parking Lot
 E/W Street : Fuller Street
 City/State : Brookline, MA
 Weather : Clear

File Name : 73680003
 Site Code : 73680003
 Start Date : 7/19/2016
 Page No : 8

	Parking Lot			Fuller St			Fuller St			
	From North			From East			From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	1	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	1	1	1
% App. Total	0	0		0	0		0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.250	.250



SEASONAL ADJUSTMENT DATA

2. ORGANIZING TRAFFIC COUNT DATA

NMCOG uses the HPMS Road Inventory Functional Classification Code for the Commonwealth of Massachusetts in categorizing each count performed. The classification of roadways is performed by MassDOT with funding provided by the Federal Highway Administration (FHWA) through its State Planning and Research Program. NMCOG's traffic counts are separated into urban (U) or rural (R) designations and coded based on the following functional classifications:

- 0 = Local
- 1 = Interstate
- 2 = Principal Arterial
- 3 = Rural Minor Arterial or Urban Principal Arterial
- 5 = Urban Minor Arterial or Rural Major Collector
- 6 = Urban Collector or Rural Minor Collector

These classifications are determined based on the role the roadway plays within the transportation network. The level of mobility for each class increases from the low mobility local road class to the high mobility Interstate classification. For example, "Rock Street East of Mount Vernon Street in Lowell" is a collector road in an urban area. Thus the functional classification would be designated as "U6". Map 2.1 shows the with functional classifications network for the regional roadway.

2.1 AVERAGE DAILY TRAFFIC

Average Daily Traffic (ADT) counts represent the average number of vehicles passing a specified point during a 24-hour time period over an entire year. NMCOG counts specific locations for a minimum of 48 hours during the week. Data is collected and then averaged to produce average weekday traffic (AWD) volume. The AWD is then multiplied by an axle correction factor and a seasonal adjustment factor to determine the ADT volume presented in this report. Mass Dot's 2014 seasonal adjustment factors and the 2014 axle correction factors are presented in Tables 2.1 and 2.1a.

Table 2.1: MassDOT Highway Division's Statewide: 2014 Seasonal Adjustment Factors

2014 Weekday Seasonal Factors		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Factor Group													
Group 2: Rural Major Collector, R5, R6 & R0		1.12	1.12	1.07	0.99	0.91	0.90	0.86	0.86	0.92	0.93	1.01	1.05
Group 4: I-495 Interstate		1.02	1.00	1.00	0.96	0.92	0.89	0.85	0.83	0.93	0.96	1.01	1.03
Group 6: Urban Arterials, Collectors, & Rural Arterials, U2, U3, U5, U6, R2,R3		1.03	1.01	0.96	0.92	0.91	0.90	0.92	0.92	0.93	0.92	0.97	0.97

PUBLIC TRANIST SCHEDULES

schedule change

66

Spring March 19, 2016 - June 24, 2016

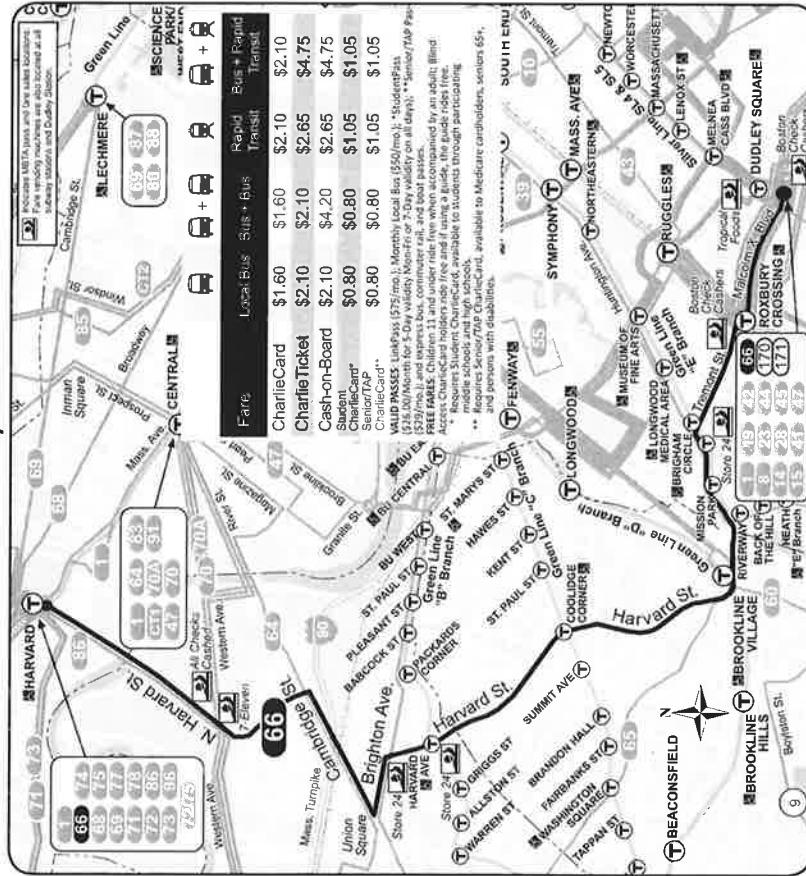
Harvard Square - Dudley Station

- Serving
- Brigham and Women's Hospital
 - Brookline Village
 - Colidge Corner
 - Union Square (Allston)
 - Red Line
 - Orange Line
 - Green Line

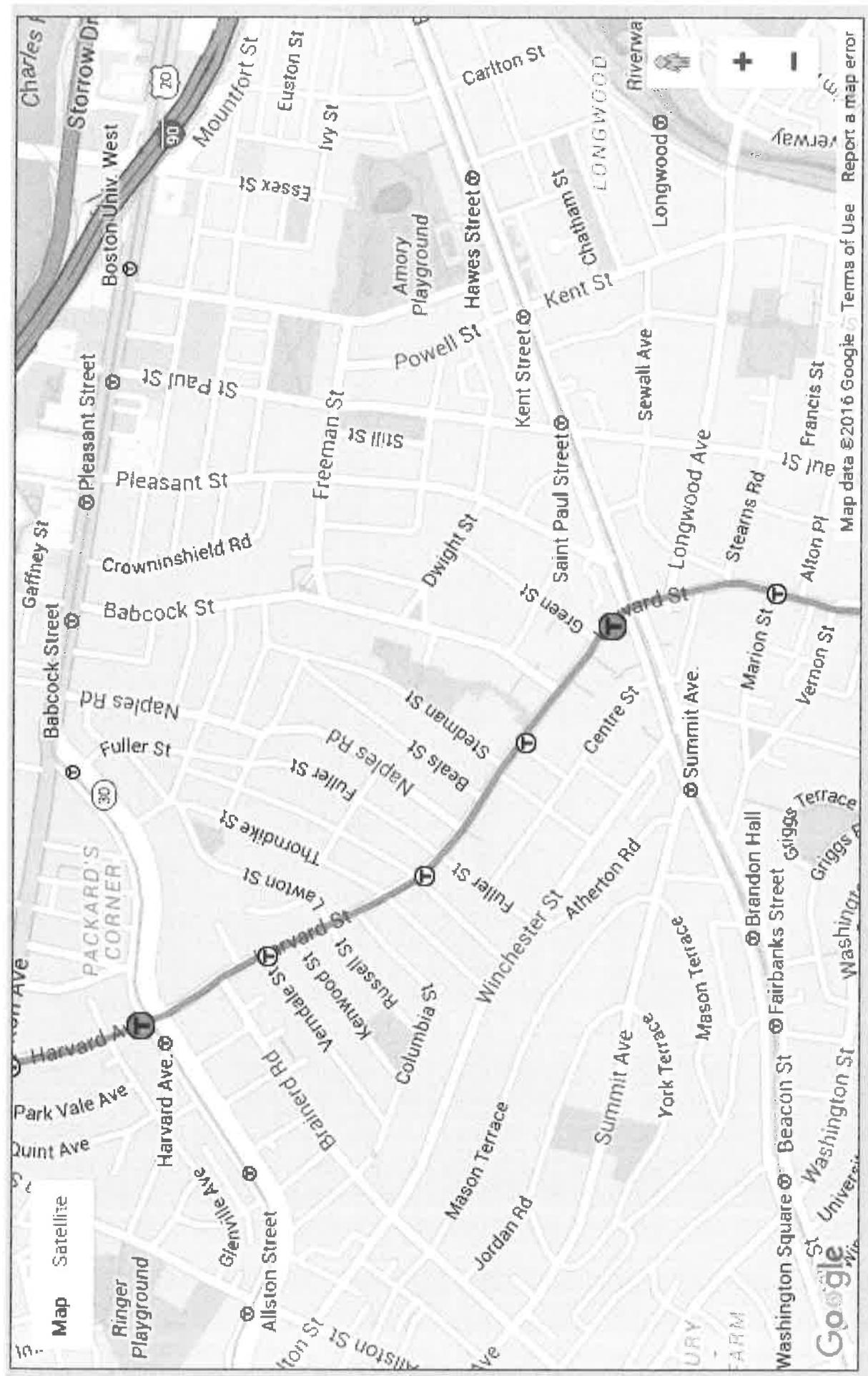


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Route 66 Harvard Station - Dudley Station



Weekday		Outbound		Inbound		Saturday		Outbound		Inbound		Sunday		Outbound		
Leave Harvard/Dawes Island	Arrive Union Square	Leave Dudley Station	Arrive Brockline Village	Leave Dudley Station	Arrive Harvard/Dawes Island	Leave Dudley Station	Arrive Union Square	Leave Dudley Station	Arrive Harvard/Dawes Island	Leave Dudley Station						
5:00A 5:08A 5:16A 5:28A 5:36 5:44 5:53 6:01 6:09 6:19 6:17 6:26 6:38 6:47 6:57 7:05 7:14 7:22 7:30 7:39 7:47 7:56 8:05 8:13 8:21 8:30 8:39 8:47 8:56 8:55 9:04 9:13 9:21 9:30 9:39 9:47 9:56 10:05 10:13 10:22 10:30 10:39 10:47 10:56 10:55 11:04 11:12 11:20 11:28 11:36 11:44 11:52 11:59 12:07 12:15 12:23 12:31 12:39 12:47 12:56 12:55 13:04 13:12 13:20 13:28 13:36 13:44 13:52 13:59 14:07 14:15 14:23 14:31 14:39 14:47 14:56 14:55 15:04 15:12 15:20 15:28 15:36 15:44 15:52 15:59 16:07 16:15 16:23 16:31 16:39 16:47 16:56 16:55 17:04 17:12 17:20 17:28 17:36 17:44 17:52 17:59 18:07 18:15 18:23 18:31 18:39 18:47 18:56 18:55 19:04 19:12 19:20 19:28 19:36 19:44 19:52 19:59 20:07 20:15 20:23 20:31 20:39 20:47 20:56 20:55 21:04 21:12 21:20 21:28 21:36 21:44 21:52 21:59 22:07 22:15 22:23 22:31 22:39 22:47 22:56 22:55 23:04 23:12 23:20 23:28 23:36 23:44 23:52 23:59 24:07 24:15 24:23 24:31 24:39 24:47 24:56 24:55 25:04 25:12 25:20 25:28 25:36 25:44 25:52 25:59 26:07 26:15 26:23 26:31 26:39 26:47 26:56 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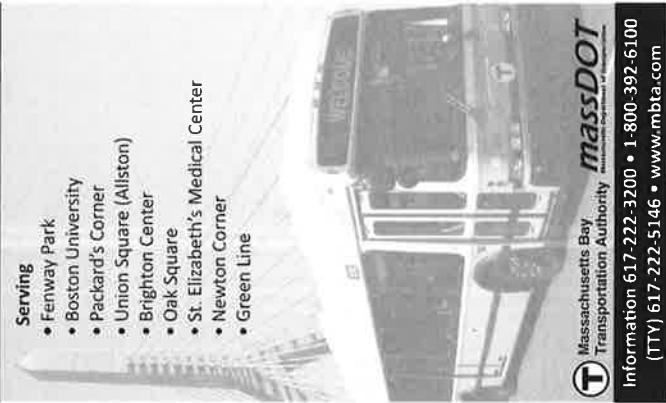


schedule change

57.57A

Spring March 19, 2016 - June 24, 2016

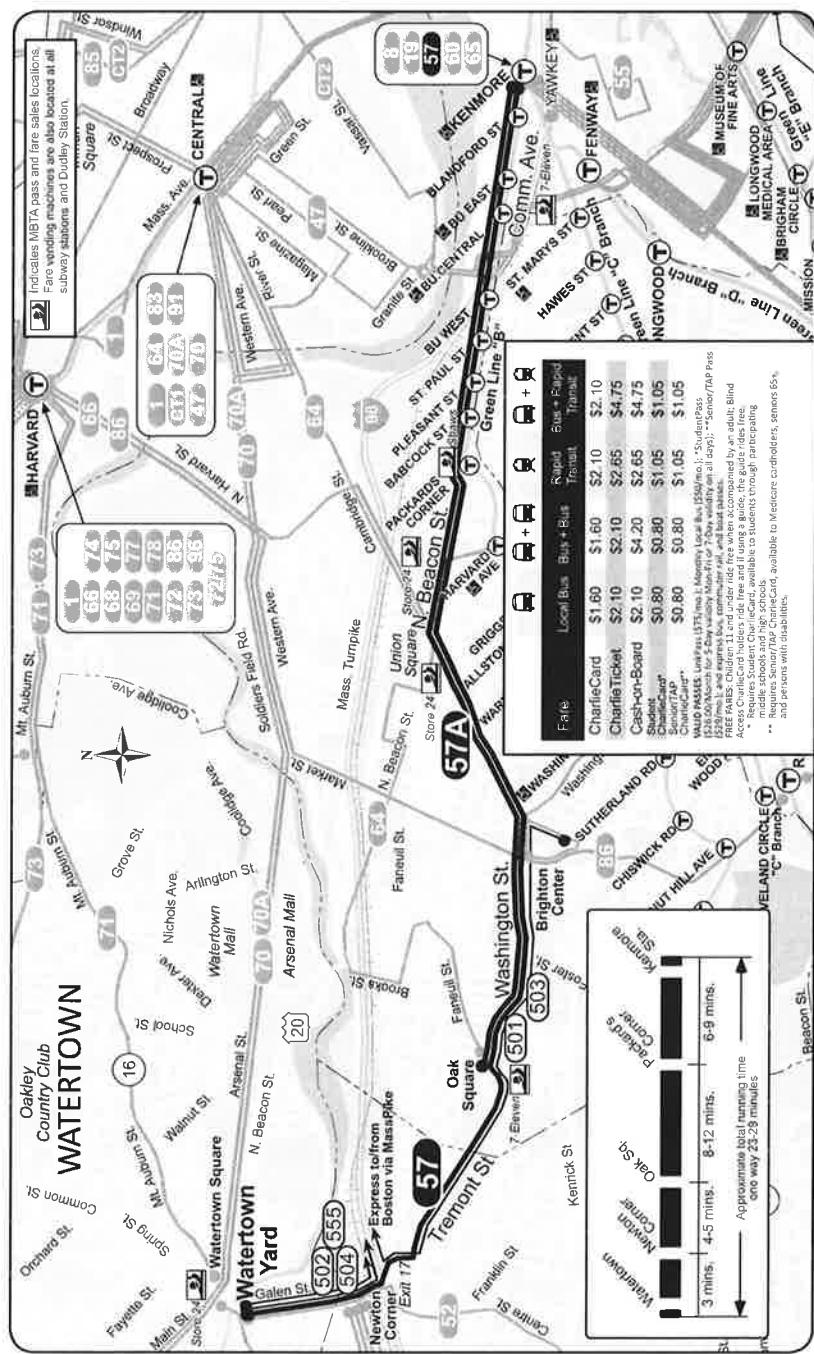
**Watertown Yard or Oak
Square-Kenmore Station**

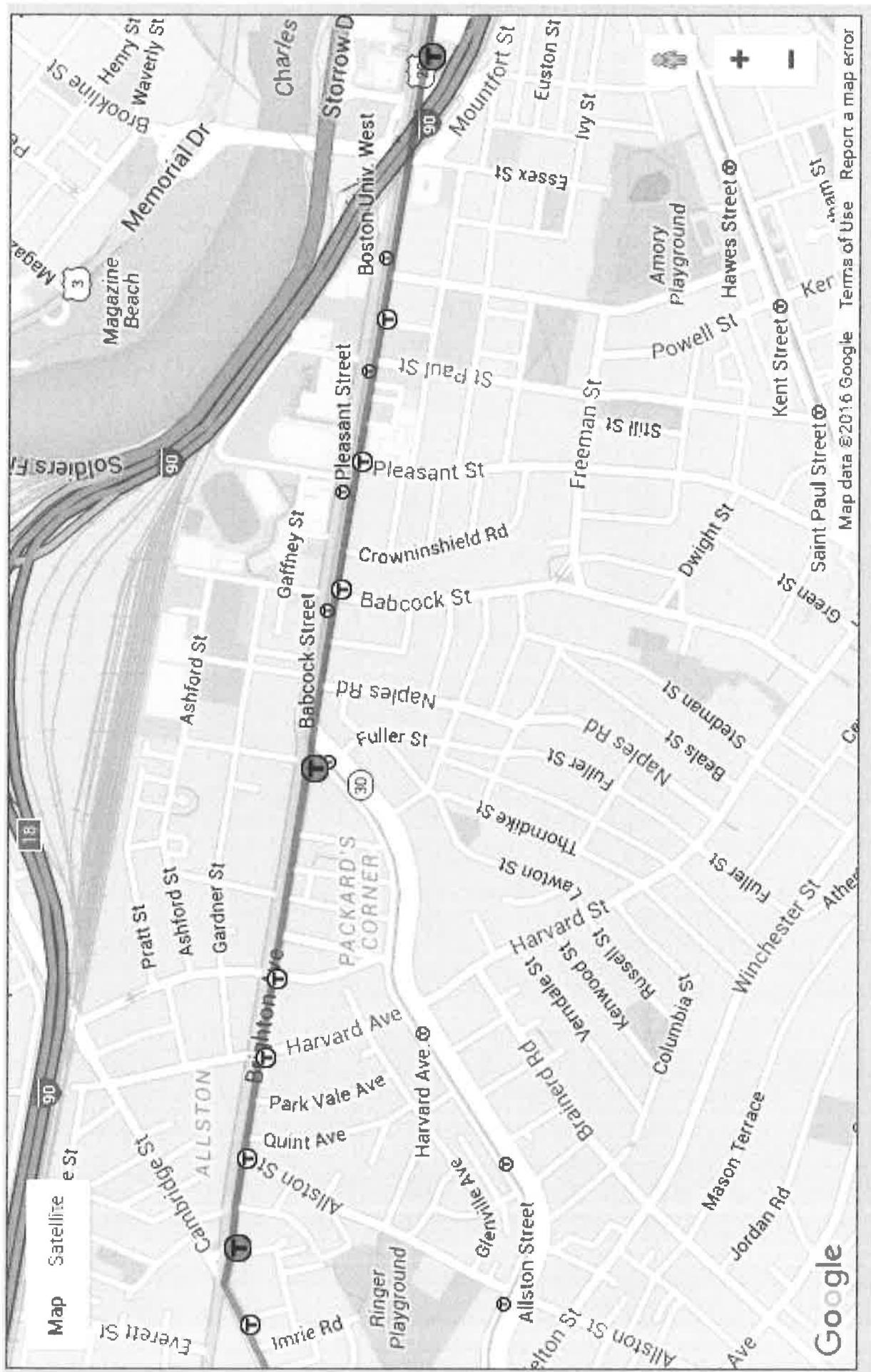


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Transportation Authority
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Route 57/57A Watertown Yard or Oak Square - Kenmore Station







Bus Fares and Passes

The T Bus system comprises Local, Inner Express, Outer Express Buses, and part of the Silver Line.

Private Bus Carriers* also service MBTA customers. For a complete listing by City/Town, please visit the Private Carrier Bus section.



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CharlieTicket/ Cash-on-board	<p>\$2.10</p> <p>\$4.75 Inner Express \$6.80 Outer Express FREE transfer to Local Bus with CharlieTicket—does not apply to cash-on-board rides.</p>
Monthly Local Bus Pass	<p>\$50/month</p> <p>Valid on Local Bus.</p>
Monthly Inner Express Pass	<p>\$115/month</p> <p>Valid on Inner Express Bus PLUS Subway, Local Bus, Inner Harbor Ferry, and Commuter Rail Zone 1A.</p>
Monthly Outer Express Pass	<p>\$168/month</p> <p>Valid on Outer Express Bus PLUS Inner Express Bus, Local Bus, Subway, Inner Harbor Ferry, and Commuter Rail Zone 1A.</p>
Monthly LinkPass	<p>\$75/month</p> <p>Valid on Subway PLUS Local Bus.</p>
Day / Week LinkPass	<p>\$12.00 for 1 day \$19.00 for 7 days</p> <p>Valid on Subway, Local Bus, Inner Harbor Ferry, and Commuter Rail Zone 1A.</p>
Seniors and Persons with Disabilities (Blind persons ride for free)	<p>\$.80/ride \$29/month for 7-day validity \$2.35 Inner Express \$3.40 Outer Express</p> <p>Valid on Local Bus and Subway. Requires a Senior/TAP ID or Mass Commission for the Blind ID. No discounts apply to Express Bus Passes.</p>
Students (Junior High and High School)	<p>\$.80/ride \$26/month for 7-day validity \$26/month for 5-day (Monday-Friday) only \$2.35 Inner Express \$3.40 Outer Express</p> <p>Valid on Bus, Subway, Express Bus, and Commuter Rail Zones 1, 1A, and 2. Requires a Student</p>

CharlieCard.

Free

Children 11 years old and under

Children under the age of twelve ride free when accompanied by an adult, with a limit of two children for each adult.



**Massachusetts Bay
Transportation Authority**

Subway Fares and Passes

The T subway system comprises the Blue, Orange, Green, Red, and even part of the Silver Line. Riders can travel anywhere on the system in any direction for the same low fare.



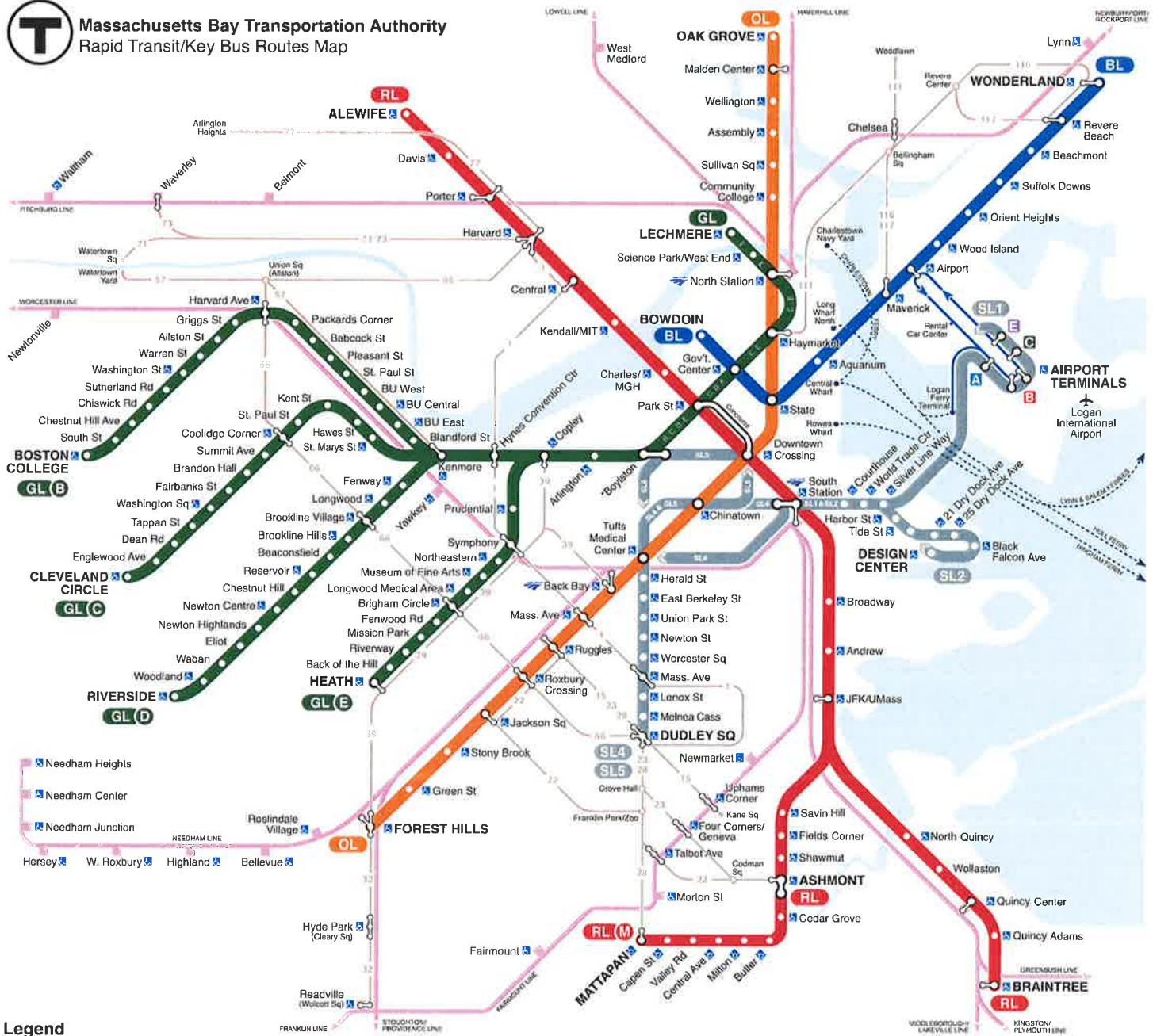
Get a CharlieCard and Save!
Then upgrade your CharlieCard with [MyCharlie](#)

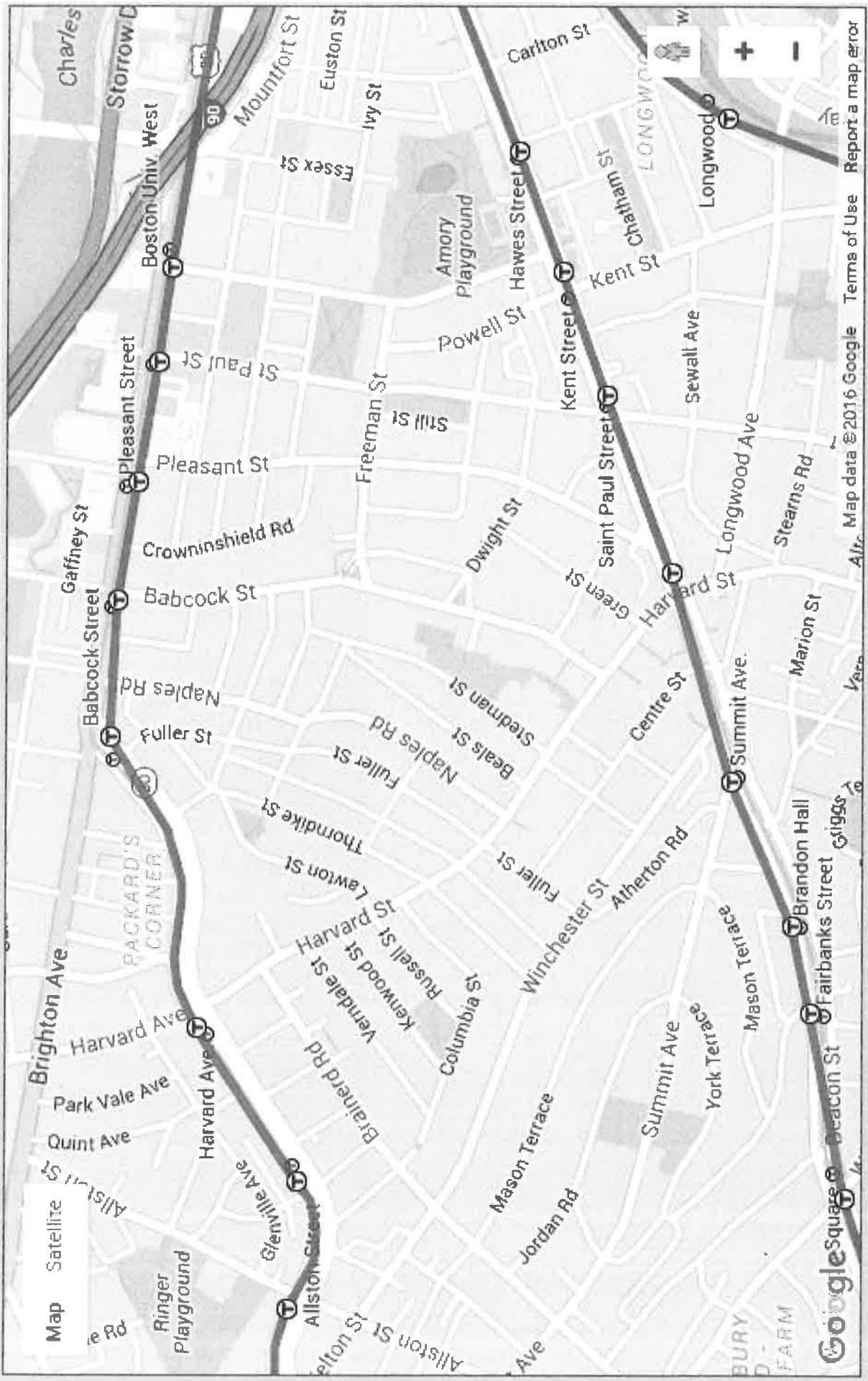
CharlieCard	\$2.10 FREE transfer to Local Bus DISCOUNTED transfer to Express Bus One Transfer valid within two hours of paying your fare.
CharlieTicket/ Cash-on-board	\$2.65
Monthly LinkPass	\$75/month Valid on Subway plus Local Bus.
Day/Week LinkPass	\$12.00 for 1 day \$19.00 for 7 days Valid on Subway, Local Bus, Commuter Rail Zone 1A, and Inner-Harbor Ferry and only if purchased on a CharlieTicket.
Seniors and Persons with Disabilities (Blind persons ride for free)	\$1.05/ride \$29/month Valid on Local Bus and Subway. Requires a Senior/TAP ID or Blind Access Card.
Students (Junior High and High School)	\$1.05/ride \$26/month for 7-day validity \$26/month for 5-day (Monday-Friday) only Valid on Bus, Subway, Express Bus, and Commuter Rail Zones 1, 1A, and 2. Requires a Student CharlieCard.
Children 11 years old and under	Free Children under the age of twelve ride free when accompanied by an adult, with a limit of two children for each adult.



Massachusetts Bay Transportation Authority

Rapid Transit/Key Bus Routes Map





Map

Satellite

PhD

Ringer
Playground

Brighton Ave

Park Vale Ave

Quint Ave

Allis

Lane

Ringer

Playground

Storrow Dr

Boston Univ. West

BU

T

PhD

St Paul St

T

PhD

Pleasant St

T

PhD

Crowninshield Rd

T

PhD

Babcock St

T

PhD

Naples Rd

T

PhD

Fuller St

T

PhD

PACKARD'S

corner

T

PhD

Harvard Ave

T

PhD

Harvard Ave

T

PhD

Grenville Ave

T

PhD

Allston Street

T

PhD

Allston St

T

MOTOR VEHCILE CRASH DATA

MassDOT Crash Report for Harvard Street at Fuller Street in Brookline 2010-2014

Crash Date	Crash Severity	Manner of Collision	Road Surface	Ambient Light	Weather Condition	Street Number	Roadway
4/22/2011	Property damage only (none injured)	Rear-end	Dry	Daylight	Clear		Harvard Street / Fuller Street
9/15/2011	Property damage only (none injured)	Sideswipe, same direction	Wet	Daylight	Rain		Harvard Street / Fuller Street
2/12/2012	Non-fatal injury	Sideswipe, same direction	Dry	Daylight	Clear	423	Harvard Street
7/6/2012	Non-fatal injury	Angle	Dry	Daylight	Clear		Harvard Street / Fuller Street
10/21/2012	Property damage only (none injured)	Sideswipe, same direction	Dry	Daylight	Clear	404	Harvard Street
10/23/2012	Non-fatal injury	Single Vehicle Crash (FO)	Dry	Dark - lighted roadway	Clear		Harvard Street / Fuller Street
4/23/2013	Non-fatal injury	Head-on	Wet	Daylight	Rain		Harvard Street / Fuller Street
10/31/2014	Property damage only (none injured)	Sideswipe, same direction	Dry	Daylight	Cloudy	409	Harvard Street

MassDOT Crash Report for Harvard Street at Coolidge Street in Brookline 2010-2014

Crash Date	Crash Severity	Manner of Collision	Road Surface	Ambient Light	Weather Condition	Street Number	Roadway
7/30/2012	Non-fatal injury	Rear-end	Dry	Daylight	Clear		Harvard Street / Coolidge Street
3/16/2014	Property damage only (none injured)	Sideswipe, same direction	Dry	Dusk	Clear	428	Haravrd Street
6/7/2014	Non-fatal injury	Single Vehicle Crash (other)	Dry	Dayligh	Clear	437	Harvard Street / Coolidge Street

TRIP GENERATION CALCULATIONS

Institute of Transportation Engineers (ITE)
Trip Generation, 9th Edition
Land Use Code (LUC) 220 - Apartment

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 36

AVERAGE WEEKDAY DAILY

T = 6.65 * (X)
T = 6.65 * 36
T = 239.40
T = 240 vehicle trips
with 50% (120 vpd) entering and 50% (120 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.51 * (X)
T = 0.51 * 36
T = 18.36
T = 18 vehicle trips
with 20% (4 vph) entering and 80% (14 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.62 * (X)
T = 0.62 * 36
T = 22.32
T = 22 vehicle trips
with 65% (14 vph) entering and 35% (8 vph) exiting.

SATURDAY DAILY

T = 6.39 * (X)
T = 6.39 * 36
T = 230.04
T = 230 vehicle trips
with 50% (115 vpd) entering and 50% (115 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

T = 0.52 * (X)
T = 0.52 * 36
T = 18.72
T = 19 vehicle trips
with 53% (10 vph) entering and 47% (9 vph) exiting.
(same distribution split as ITE LUC 210 during the Saturday midday peak hour of generator)

DP03

SELECTED ECONOMIC CHARACTERISTICS

2010-2014 American Community Survey 5-Year Estimates

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the [Data and Documentation](#) section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the [Methodology](#) section.

Versions of this table are available for the following years:	1 137 of 137	Subject	Brookline town, Norfolk County, Massachusetts			
			Estimate	Margin of Error	Percent	Percent Margin of Error
EMPLOYMENT STATUS						
		Population 16 years and over	49,466	+/-573	49,466	(X)
		In labor force	33,442	+/-939	67.6%	+/-1.7
		Civilian labor force	33,442	+/-939	67.6%	+/-1.7
		Employed	31,576	+/-916	63.8%	+/-1.7
		Unemployed	1,866	+/-355	3.8%	+/-0.7
		Armed Forces	0	+/-29	0.0%	+/-0.1
		Not in labor force	16,024	+/-869	32.4%	+/-1.7
		Civilian labor force	33,442	+/-939	33,442	(X)
		Percent Unemployed	(X)	(X)	5.6%	+/-1.0
		Females 16 years and over	28,508	+/-620	28,508	(X)
		In labor force	17,906	+/-700	62.8%	+/-2.1
		Civilian labor force	17,906	+/-700	62.8%	+/-2.1
		Employed	16,770	+/-651	58.8%	+/-2.0
		Own children under 6 years	3,808	+/-391	3,808	(X)
		All parents in family in labor force	2,424	+/-369	63.7%	+/-7.0
		Own children 6 to 17 years	6,827	+/-437	6,827	(X)
		All parents in family in labor force	4,346	+/-439	63.7%	+/-5.4
COMMUTING TO WORK						
		Workers 16 years and over	31,080	+/-931	31,080	(X)
		Car, truck, or van -- drove alone	12,355	+/-889	39.8%	+/-2.4
		Car, truck, or van -- carpooled	1,721	+/-358	5.5%	+/-1.1
		Public transportation (excluding taxicab)	8,297	+/-704	26.7%	+/-2.1
		Walked	4,919	+/-507	15.8%	+/-1.7
		Other means	1,560	+/-276	5.0%	+/-0.9
		Worked at home	2,228	+/-347	7.2%	+/-1.1
		Mean travel time to work (minutes)	28.6	+/-0.8	(X)	(X)
OCCUPATION						
		Civilian employed population 16 years and over	31,576	+/-916	31,576	(X)
		Management, business, science, and arts occupations	23,933	+/-765	75.8%	+/-2.0
		Service occupations	2,519	+/-385	8.0%	+/-1.2
		Sales and office occupations	4,475	+/-555	14.2%	+/-1.5
		Natural resources, construction, and	286	+/-141	0.9%	+/-0.4

maintenance occupations Production, transportation, and material moving occupations	363	+/-106	1.1%	+/-0.3
INDUSTRY				
Civilian employed population 16 years and over	31,576	+/-916	31,576	(X)
Agriculture, forestry, fishing and hunting, and mining	0	+/-29	0.0%	+/-0.1
Construction	283	+/-109	0.9%	+/-0.3
Manufacturing	1,459	+/-263	4.6%	+/-0.8
Wholesale trade	385	+/-183	1.2%	+/-0.6
Retail trade	1,869	+/-384	5.9%	+/-1.2
Transportation and warehousing, and utilities	111	+/-62	0.4%	+/-0.2
Information	1,023	+/-201	3.2%	+/-0.7
Finance and insurance, and real estate and rental and leasing	3,030	+/-466	9.6%	+/-1.4
Professional, scientific, and management, and administrative and waste management services	6,425	+/-491	20.3%	+/-1.4
Educational services, and health care and social assistance	13,400	+/-691	42.4%	+/-2.0
Arts, entertainment, and recreation, and accommodation and food services	1,961	+/-370	6.2%	+/-1.1
Other services, except public administration	902	+/-219	2.9%	+/-0.7
Public administration	728	+/-169	2.3%	+/-0.5
CLASS OF WORKER				
Civilian employed population 16 years and over	31,576	+/-916	31,576	(X)
Private wage and salary workers	26,942	+/-936	85.3%	+/-1.4
Government workers	2,289	+/-307	7.2%	+/-1.0
Self-employed in own not incorporated business workers	2,338	+/-359	7.4%	+/-1.1
Unpaid family workers	7	+/-11	0.0%	+/-0.1
INCOME AND BENEFITS (IN 2014 INFLATION-ADJUSTED DOLLARS)				
Total households	25,408	+/-503	25,408	(X)
Less than \$10,000	2,433	+/-378	9.6%	+/-1.4
\$10,000 to \$14,999	875	+/-198	3.4%	+/-0.8
\$15,000 to \$24,999	1,211	+/-189	4.8%	+/-0.7
\$25,000 to \$34,999	1,198	+/-280	4.7%	+/-1.1
\$35,000 to \$49,999	1,977	+/-310	7.8%	+/-1.2
\$50,000 to \$74,999	3,199	+/-331	12.6%	+/-1.3
\$75,000 to \$99,999	2,399	+/-280	9.4%	+/-1.1
\$100,000 to \$149,999	4,504	+/-443	17.7%	+/-1.7
\$150,000 to \$199,999	2,302	+/-319	9.1%	+/-1.3
\$200,000 or more	5,310	+/-447	20.9%	+/-1.7
Median household income (dollars)	93,640	+/-3,802	(X)	(X)
Mean household income (dollars)	142,062	+/-6,782	(X)	(X)
With earnings	19,988	+/-475	78.7%	+/-1.6
Mean earnings (dollars)	151,205	+/-7,757	(X)	(X)
With Social Security	5,832	+/-468	23.0%	+/-1.7
Mean Social Security income (dollars)	18,371	+/-929	(X)	(X)
With retirement income	3,118	+/-368	12.3%	+/-1.4
Mean retirement income (dollars)	32,403	+/-4,362	(X)	(X)
With Supplemental Security Income	700	+/-189	2.8%	+/-0.7
Mean Supplemental Security Income (dollars)	8,367	+/-1,234	(X)	(X)
With cash public assistance income	348	+/-138	1.4%	+/-0.5
Mean cash public assistance income (dollars)	6,748	+/-4,094	(X)	(X)

With Food Stamp/SNAP benefits in the past 12 months	1,191	+/-246	4.7%	+/-1.0
Families	13,118	+/-368	13,118	(X)
Less than \$10,000	340	+/-149	2.6%	+/-1.1
\$10,000 to \$14,999	83	+/-78	0.6%	+/-0.6
\$15,000 to \$24,999	310	+/-113	2.4%	+/-0.8
\$25,000 to \$34,999	350	+/-149	2.7%	+/-1.1
\$35,000 to \$49,999	786	+/-221	6.0%	+/-1.6
\$50,000 to \$74,999	1,112	+/-210	8.5%	+/-1.6
\$75,000 to \$99,999	1,261	+/-201	9.6%	+/-1.5
\$100,000 to \$149,999	2,523	+/-332	19.2%	+/-2.5
\$150,000 to \$199,999	1,767	+/-266	13.5%	+/-2.0
\$200,000 or more	4,586	+/-377	35.0%	+/-2.8
Median family income (dollars)	144,904	+/-9,733	(X)	(X)
Mean family income (dollars)	204,572	+/-10,583	(X)	(X)
Per capita income (dollars)	62,148	+/-2,984	(X)	(X)
Nonfamily households	12,290	+/-522	12,290	(X)
Median nonfamily income (dollars)	52,150	+/-4,270	(X)	(X)
Mean nonfamily income (dollars)	73,537	+/-5,605	(X)	(X)
Median earnings for workers (dollars)	55,791	+/-2,838	(X)	(X)
Median earnings for male full-time, year-round workers (dollars)	85,741	+/-7,733	(X)	(X)
Median earnings for female full-time, year-round workers (dollars)	66,018	+/-2,427	(X)	(X)
HEALTH INSURANCE COVERAGE				
Civilian noninstitutionalized population	58,520	+/-133	58,520	(X)
With health insurance coverage	57,523	+/-417	98.3%	+/-0.7
With private health insurance	52,787	+/-817	90.2%	+/-1.4
With public coverage	11,111	+/-862	19.0%	+/-1.5
No health insurance coverage	997	+/-393	1.7%	+/-0.7
Civilian noninstitutionalized population under 18 years	10,865	+/-512	10,865	(X)
No health insurance coverage	136	+/-97	1.3%	+/-0.9
Civilian noninstitutionalized population 18 to 64 years	39,135	+/-615	39,135	(X)
In labor force:	30,244	+/-874	30,244	(X)
Employed:	28,450	+/-824	28,450	(X)
With health insurance coverage	28,116	+/-794	98.8%	+/-0.5
With private health insurance	27,464	+/-834	96.5%	+/-0.9
With public coverage	954	+/-226	3.4%	+/-0.8
No health insurance coverage	334	+/-151	1.2%	+/-0.5
Unemployed:	1,794	+/-350	1,794	(X)
With health insurance coverage	1,667	+/-345	92.9%	+/-4.4
With private health insurance	1,358	+/-320	75.7%	+/-8.5
With public coverage	317	+/-145	17.7%	+/-7.4
No health insurance coverage	127	+/-79	7.1%	+/-4.4
Not in labor force:	8,891	+/-790	8,891	(X)
With health insurance coverage	8,522	+/-767	95.8%	+/-3.2
With private health insurance	7,403	+/-741	83.3%	+/-4.1
With public coverage	1,432	+/-272	16.1%	+/-3.0
No health insurance coverage	369	+/-292	4.2%	+/-3.2
PERCENTAGE OF FAMILIES AND PEOPLE WHOSE INCOME IN THE PAST 12 MONTHS IS BELOW THE POVERTY LEVEL				

All families	(X)	(X)	3.5%	+/-1.2
With related children under 18 years	(X)	(X)	5.7%	+/-2.2
With related children under 5 years only	(X)	(X)	5.5%	+/-6.4
Married couple families	(X)	(X)	1.0%	+/-0.7
With related children under 18 years	(X)	(X)	1.6%	+/-1.4
With related children under 5 years only	(X)	(X)	1.1%	+/-1.8
Families with female householder, no husband present	(X)	(X)	15.7%	+/-7.2
With related children under 18 years	(X)	(X)	24.0%	+/-11.2
With related children under 5 years only	(X)	(X)	53.7%	+/-48.7
All people	(X)	(X)	11.8%	+/-1.2
Under 18 years	(X)	(X)	6.5%	+/-2.4
Related children under 18 years	(X)	(X)	5.8%	+/-2.4
Related children under 5 years	(X)	(X)	7.1%	+/-4.6
Related children 5 to 17 years	(X)	(X)	5.3%	+/-2.1
18 years and over	(X)	(X)	13.0%	+/-1.4
18 to 64 years	(X)	(X)	14.1%	+/-1.7
65 years and over	(X)	(X)	8.5%	+/-2.3
People in families	(X)	(X)	3.3%	+/-1.2
Unrelated individuals 15 years and over	(X)	(X)	28.8%	+/-3.3

Source: U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

Explanation of Symbols:

An '***' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.

An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.

An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.

An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.

An '***' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.

An '****' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.

An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.

An '(X)' means that the estimate is not applicable or not available.

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see [Accuracy of the Data](#)). The effect of nonsampling error is not represented in these tables.

Workers include members of the Armed Forces and civilians who were at work last week.

Occupation codes are 4-digit codes and are based on Standard Occupational Classification 2010.

Industry codes are 4-digit codes and are based on the North American Industry Classification System (NAICS). The Census industry codes for 2013 and later years are based on the 2012 revision of the NAICS. To allow for the creation of 2010-2014 tables, industry data in the multiyear files (2010-2014) were recoded to 2013 Census industry codes. We recommend using caution when comparing data coded using 2013 Census industry codes with data coded using Census industry codes prior to 2013. For more information on the Census industry code changes, please visit our website at <http://www.census.gov/people/io/methodology/>.

Logical coverage edits applying a rules-based assignment of Medicaid, Medicare and military health coverage were added as of 2009 -- please see http://www.census.gov/hhes/www/hlthins/publications/coverage_edits_final.pdf for more details. The corresponding 2008 data table in American FactFinder does not incorporate these edits and is therefore not comparable to this table in 2009, 2010, 2011, or 2012. Select geographies of 2008 data comparable to the 2009, 2010, 2011, and 2012 tables are accessible at <http://www.census.gov/hhes/www/hlthins/data/acs/2008/re-run.html>.

The health insurance coverage category names were modified in 2010. See ACS Health Insurance Definitions for a list of the insurance type definitions.

While the 2010-2014 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

CAPACITY ANALYSIS

Harvard Street at Fuller Street
Harvard Street at Coolidge Street
Fuller Street at Site Drive

Harvard Street at Fuller Street

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2016 Existing AM

8/17/2016

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	23	47	11	32	12	89	373	1	5	468	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	12	11	11	12	10	11	12
Storage Length (ft)	0	0	0	0		0	80		0	50		0
Storage Lanes	0	0	0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.970						0.987	
Flt Protected		0.977			0.990		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1912	0	1694	1766	0	1685	1749	0
Flt Permitted		0.844			0.923		0.415			0.466		
Satd. Flow (perm)	0	1525	0	0	1783	0	740	1766	0	826	1749	0
Right Turn on Red			No			No			No		No	
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		190			213			283			204	
Travel Time (s)		4.3			4.8			6.4			4.6	
Peak Hour Factor	0.86	0.86	0.86	0.72	0.72	0.72	0.78	0.78	0.78	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	3%	4%	0%	0%	4%	0%
Adj. Flow (vph)	70	27	55	15	44	17	114	478	1	6	520	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	152	0	0	76	0	114	479	0	6	568	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	1.00	1.04	1.04	1.00	1.09	1.04	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0		0.0		0.0	
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9

Lanes, Volumes, Timings 3: Harvard Street & Fuller Street

2016 Existing AM
8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	18.0	18.0		18.0	18.0		74.0	74.0		74.0	74.0	
Total Split (%)	15.9%	15.9%		15.9%	15.9%		65.5%	65.5%		65.5%	65.5%	
Maximum Green (s)	13.0	13.0		13.0	13.0		69.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	12.9			12.9			69.0	69.0		69.0	69.0	
Actuated g/C Ratio	0.14			0.14			0.75	0.75		0.75	0.75	
v/c Ratio	0.71			0.31			0.21	0.36		0.01	0.43	
Control Delay	57.5			39.2			4.4	4.8		3.0	5.4	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	57.5			39.2			4.4	4.8		3.0	5.4	
LOS	E			D			A	A		A	A	
Approach Delay	57.5			39.2				4.7			5.4	
Approach LOS	E			D			A				A	

Intersection Summary

Area Type: Other

Cycle Length: 113

Actuated Cycle Length: 91.9

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 12.6

Intersection Capacity Utilization

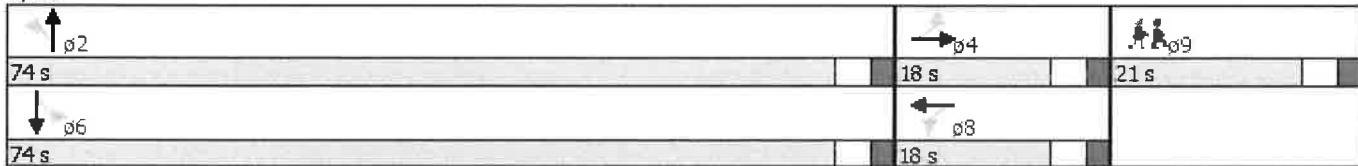
Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service B

Splits and Phases: 3:1

Splits and Phases: 3: Harvard Street & Fuller Street



Lane Group	ø9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	19%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
3: Harvard Street & Fuller Street

2016 Existing AM
8/17/2016



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	152	76	114	479	6	568
v/c Ratio	0.71	0.31	0.21	0.36	0.01	0.43
Control Delay	57.5	39.2	4.4	4.8	3.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	39.2	4.4	4.8	3.0	5.4
Queue Length 50th (ft)	86	40	16	78	1	100
Queue Length 95th (ft)	#162	65	27	94	3	149
Internal Link Dist (ft)	110	133		203		124
Turn Bay Length (ft)			80		50	
Base Capacity (vph)	215	251	556	1326	620	1313
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.30	0.21	0.36	0.01	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2016 Existing PM
8/17/2016

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	21	27	10	32	11	23	424	6	12	461	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	12	11	11	12	10	11	12
Storage Length (ft)	0		0	0		0	80		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.968			0.973			0.998			0.990	
Flt Protected		0.972			0.991		0.950			0.950		
Satd. Flow (prot)	0	1788	0	0	1954	0	1745	1798	0	1685	1802	0
Flt Permitted		0.838			0.944		0.449			0.473		
Satd. Flow (perm)	0	1541	0	0	1862	0	825	1798	0	839	1802	0
Right Turn on Red			No			No			No		No	
Satd. Flow (RTOR)												No
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		190			213			283			204	
Travel Time (s)		4.3			4.8			6.4			4.6	
Peak Hour Factor	0.95	0.95	0.95	0.83	0.83	0.83	0.91	0.91	0.91	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	67	22	28	12	39	13	25	466	7	12	480	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	117	0	0	64	0	25	473	0	12	515	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			11			11	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	1.00	1.04	1.04	1.00	1.09	1.04	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0		0.0		0.0	
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2016 Existing PM
8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	18.0	18.0		18.0	18.0		74.0	74.0		74.0	74.0	
Total Split (%)	15.9%	15.9%		15.9%	15.9%		65.5%	65.5%		65.5%	65.5%	
Maximum Green (s)	13.0	13.0		13.0	13.0		69.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.0			5.0		5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	11.5			11.5			69.0	69.0		69.0	69.0	
Actuated g/C Ratio	0.13			0.13			0.76	0.76		0.76	0.76	
v/c Ratio	0.60			0.27			0.04	0.35		0.02	0.38	
Control Delay	50.5			38.6			3.1	4.5		3.0	4.7	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	50.5			38.6			3.1	4.5		3.0	4.7	
LOS	D			D			A	A		A	A	
Approach Delay	50.5			38.6				4.4			4.6	
Approach LOS	D			D				A			A	

Intersection Summary

Area Type: Other

Cycle Length: 113

Actuated Cycle Length: 90.6

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 10.8

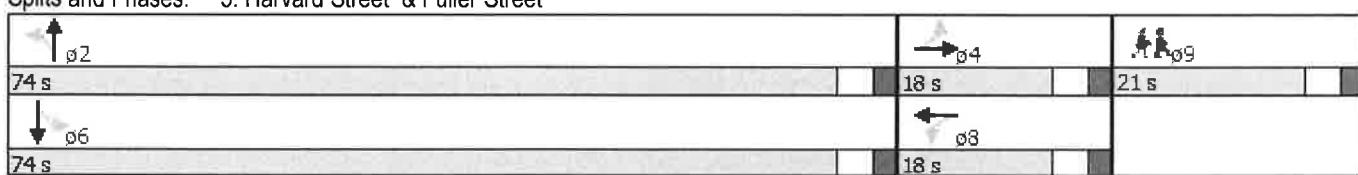
Intersection LOS: B

Intersection Capacity Utilization 47.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Harvard Street & Fuller Street



Lane Group	ø9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	19%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
3: Harvard Street & Fuller Street

2016 Existing PM
8/17/2016



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	117	64	25	473	12	515
v/c Ratio	0.60	0.27	0.04	0.35	0.02	0.38
Control Delay	50.5	38.6	3.1	4.5	3.0	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	38.6	3.1	4.5	3.0	4.7
Queue Length 50th (ft)	64	34	3	75	1	85
Queue Length 95th (ft)	120	66	9	114	5	128
Internal Link Dist (ft)	110	133		203		124
Turn Bay Length (ft)			80		50	
Base Capacity (vph)	221	267	628	1370	639	1373
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.24	0.04	0.35	0.02	0.38

Intersection Summary

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 No-Build AM

8/17/2016

	←	→	↓	↑	←	→	↓	↑	←	→	↓	↑
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	25	51	12	35	13	95	438	1	5	532	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	12	11	11	12	10	11	12
Storage Length (ft)	0		0	0		0	80		0	50		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.971						0.988	
Flt Protected		0.977			0.990		0.950			0.950		
Satd. Flow (prot)	0	1765	0	0	1915	0	1694	1766	0	1685	1750	0
Flt Permitted		0.857			0.926		0.382			0.468		
Satd. Flow (perm)	0	1549	0	0	1791	0	681	1766	0	830	1750	0
Right Turn on Red			No			No			No		No	
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		190			213			283			204	
Travel Time (s)		4.3			4.8			6.4			4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	3%	4%	0%	0%	4%	0%
Adj. Flow (vph)	70	27	55	13	38	14	103	476	1	5	578	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	152	0	0	65	0	103	477	0	5	628	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		0			0			11			11	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	1.00	1.04	1.04	1.00	1.09	1.04	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 No-Build AM
8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	18.0	18.0		18.0	18.0		74.0	74.0		74.0	74.0	
Total Split (%)	15.9%	15.9%		15.9%	15.9%		65.5%	65.5%		65.5%	65.5%	
Maximum Green (s)	13.0	13.0		13.0	13.0		69.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0			5.0			5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	12.7			12.7			69.0	69.0		69.0	69.0	
Actuated g/C Ratio	0.14			0.14			0.75	0.75		0.75	0.75	
v/c Ratio	0.71			0.26			0.20	0.36		0.01	0.48	
Control Delay	57.5			38.4			4.5	4.8		3.0	5.8	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	57.5			38.4			4.5	4.8		3.0	5.8	
LOS	E			D			A	A		A	A	
Approach Delay	57.5			38.4				4.7			5.8	
Approach LOS	E			D				A			A	

Intersection Summary

Area Type: Other

Cycle Length: 113

Actuated Cycle Length: 91.7

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 12.3

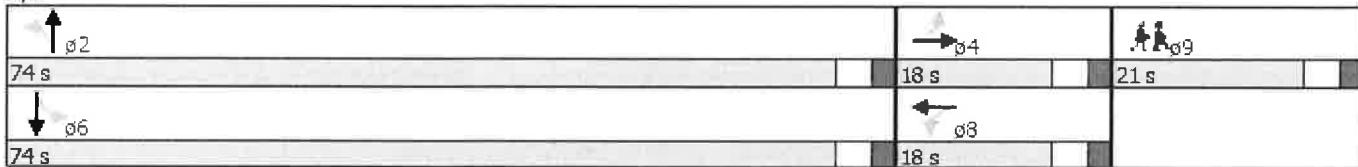
Intersection LOS: B

Intersection Capacity Utilization 63.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Harvard Street & Fuller Street



Lane Group	ø9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	19%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Efft Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

3: Harvard Street & Fuller Street



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	152	65	103	477	5	628
v/c Ratio	0.71	0.26	0.20	0.36	0.01	0.48
Control Delay	57.5	38.4	4.5	4.8	3.0	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.5	38.4	4.5	4.8	3.0	5.8
Queue Length 50th (ft)	85	34	14	77	1	116
Queue Length 95th (ft)	#173	73	30	117	3	174
Internal Link Dist (ft)	110	133		203		124
Turn Bay Length (ft)			80		50	
Base Capacity (vph)	219	254	512	1329	624	1317
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.26	0.20	0.36	0.01	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 No Build PM

8/17/2016

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	23	29	11	34	12	25	483	6	13	523	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	12	11	11	12	10	11	12
Storage Length (ft)	0	0	0	0	0	80	0	0	50	0	0	0
Storage Lanes	0	0	0	0	0	1	0	0	1	0	1	0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.972			0.998			0.990	
Flt Protected		0.972			0.990		0.950			0.950		
Satd. Flow (prot)	0	1786	0	0	1950	0	1745	1798	0	1685	1801	0
Flt Permitted		0.838			0.940		0.409			0.438		
Satd. Flow (perm)	0	1540	0	0	1852	0	751	1798	0	777	1801	0
Right Turn on Red			No			No			No		No	
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		190			213			283			204	
Travel Time (s)		4.3			4.8			6.4			4.6	
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	73	24	31	12	37	13	27	525	7	14	545	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	128	0	0	62	0	27	532	0	14	583	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0			0			11			11		
Link Offset(ft)	0			0			0			0		
Crosswalk Width(ft)	16			16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	1.00	1.04	1.04	1.00	1.09	1.04	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 No Build PM

8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	18.0	18.0		18.0	18.0		74.0	74.0		74.0	74.0	
Total Split (%)	15.9%	15.9%		15.9%	15.9%		65.5%	65.5%		65.5%	65.5%	
Maximum Green (s)	13.0	13.0		13.0	13.0		69.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0			5.0			5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	11.9			11.9			69.0	69.0		69.0	69.0	
Actuated g/C Ratio	0.13			0.13			0.76	0.76		0.76	0.76	
v/c Ratio	0.64			0.26			0.05	0.39		0.02	0.43	
Control Delay	52.6			38.3			3.2	4.9		3.1	5.2	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	52.6			38.3			3.2	4.9		3.1	5.2	
LOS	D			D			A	A		A	A	
Approach Delay	52.6			38.3				4.8			5.1	
Approach LOS	D			D				A			A	

Intersection Summary

Area Type: Other

Cycle Length: 113

Actuated Cycle Length: 90.9

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 11.0

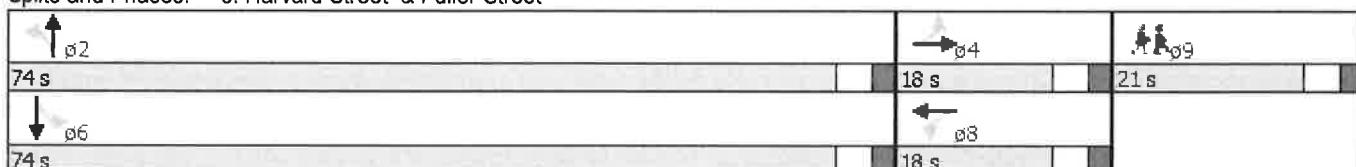
Intersection LOS: B

Intersection Capacity Utilization 51.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Harvard Street & Fuller Street



Lane Group	ø9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	19%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

3: Harvard Street & Fuller Street



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	128	62	27	532	14	583
v/c Ratio	0.64	0.26	0.05	0.39	0.02	0.43
Control Delay	52.6	38.3	3.2	4.9	3.1	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	38.3	3.2	4.9	3.1	5.2
Queue Length 50th (ft)	71	33	3	89	2	102
Queue Length 95th (ft)	#132	70	9	133	6	151
Internal Link Dist (ft)	110	133		203		124
Turn Bay Length (ft)			80		50	
Base Capacity (vph)	220	264	570	1365	589	1367
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.23	0.05	0.39	0.02	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 Build AM

8/17/2016

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	25	53	12	35	13	96	438	1	5	532	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	12	11	11	12	10	11	12
Storage Length (ft)	0	0	0	0	0	80	0	0	50	0	0	0
Storage Lanes	0	0	0	0	0	1	0	0	1	0	1	0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.950			0.971						0.988	
Flt Protected		0.977			0.990		0.950			0.950		
Satd. Flow (prot)	0	1763	0	0	1915	0	1694	1766	0	1685	1750	0
Flt Permitted		0.856			0.924		0.381			0.467		
Satd. Flow (perm)	0	1545	0	0	1788	0	679	1766	0	828	1750	0
Right Turn on Red			No			No			No		No	
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		190			213			283			204	
Travel Time (s)		4.3			4.8			6.4			4.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	8%	3%	4%	0%	0%	4%	0%
Adj. Flow (vph)	73	27	58	13	38	14	104	476	1	5	578	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	158	0	0	65	0	104	477	0	5	629	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0			0			11			11		
Link Offset(ft)	0			0			0			0		
Crosswalk Width(ft)	16			16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	1.00	1.04	1.04	1.00	1.09	1.04	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0		0.0		0.0	
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 Build AM

8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	18.0	18.0		18.0	18.0		74.0	74.0		74.0	74.0	
Total Split (%)	15.9%	15.9%		15.9%	15.9%		65.5%	65.5%		65.5%	65.5%	
Maximum Green (s)	13.0	13.0		13.0	13.0		69.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0			5.0			5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	12.9			12.9			69.0	69.0		69.0	69.0	
Actuated g/C Ratio	0.14			0.14			0.75	0.75		0.75	0.75	
v/c Ratio	0.73			0.26			0.20	0.36		0.01	0.48	
Control Delay	58.8			38.3			4.5	4.8		3.0	5.9	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	58.8			38.3			4.5	4.8		3.0	5.9	
LOS	E			D			A	A		A	A	
Approach Delay	58.8			38.3				4.7			5.9	
Approach LOS	E			D				A			A	

Intersection Summary

Area Type: Other

Cycle Length: 113

Actuated Cycle Length: 91.9

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 12.7

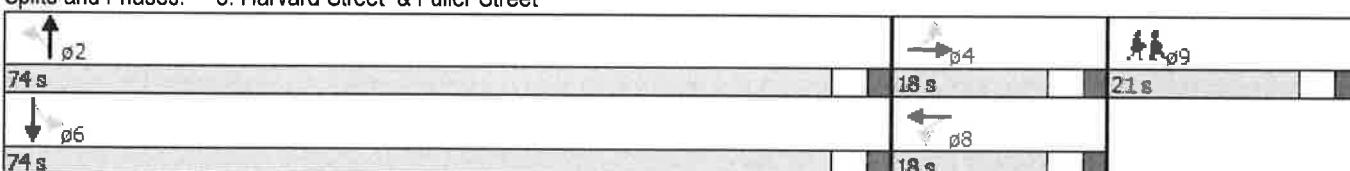
Intersection LOS: B

Intersection Capacity Utilization 63.6%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Harvard Street & Fuller Street



Lane Group	ø9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	19%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	158	65	104	477	5	629
v/c Ratio	0.73	0.26	0.20	0.36	0.01	0.48
Control Delay	58.8	38.3	4.5	4.8	3.0	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.8	38.3	4.5	4.8	3.0	5.9
Queue Length 50th (ft)	89	34	14	77	1	116
Queue Length 95th (ft)	#182	73	31	117	3	173
Internal Link Dist (ft)	110	133		203		124
Turn Bay Length (ft)			80		50	
Base Capacity (vph)	218	252	510	1326	622	1314
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.26	0.20	0.36	0.01	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 Build PM

8/17/2016

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	23	30	11	34	12	27	483	6	13	523	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	12	11	11	12	10	11	12
Storage Length (ft)	0	0	0	0	0	80	0	0	50	0	0	0
Storage Lanes	0	0	0	0	0	1	0	0	1	0	1	0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t		0.967			0.972			0.998			0.990	
Flt Protected		0.972			0.990			0.950			0.950	
Satd. Flow (prot)	0	1786	0	0	1950	0	1745	1798	0	1685	1802	0
Flt Permitted		0.837			0.939		0.407			0.438		
Satd. Flow (perm)	0	1538	0	0	1850	0	748	1798	0	777	1802	0
Right Turn on Red			No			No			No		No	
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		190			213			283			204	
Travel Time (s)		4.3			4.8			6.4			4.6	
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%
Adj. Flow (vph)	75	24	32	12	37	13	29	525	7	14	545	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	131	0	0	62	0	29	532	0	14	586	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			11			11	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	1.00	1.04	1.04	1.00	1.09	1.04	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru										
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex										
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0		0.0		0.0	
Turn Type	Perm	NA										
Protected Phases		4			8			2			6	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	9

Lanes, Volumes, Timings
3: Harvard Street & Fuller Street

2023 Build PM
8/17/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	21.0	21.0		21.0	21.0		21.0	21.0		21.0	21.0	
Total Split (s)	18.0	18.0		18.0	18.0		74.0	74.0		74.0	74.0	
Total Split (%)	15.9%	15.9%		15.9%	15.9%		65.5%	65.5%		65.5%	65.5%	
Maximum Green (s)	13.0	13.0		13.0	13.0		69.0	69.0		69.0	69.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0			5.0			5.0	5.0		5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	12.0			12.0			69.0	69.0		69.0	69.0	
Actuated g/C Ratio	0.13			0.13			0.76	0.76		0.76	0.76	
v/c Ratio	0.65			0.26			0.05	0.39		0.02	0.43	
Control Delay	53.2			38.2			3.3	4.9		3.1	5.2	
Queue Delay	0.0			0.0			0.0	0.0		0.0	0.0	
Total Delay	53.2			38.2			3.3	4.9		3.1	5.2	
LOS	D			D			A	A		A	A	
Approach Delay	53.2			38.2				4.8			5.2	
Approach LOS	D			D				A			A	

Intersection Summary

Area Type: Other

Cycle Length: 113

Actuated Cycle Length: 91

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 11.2

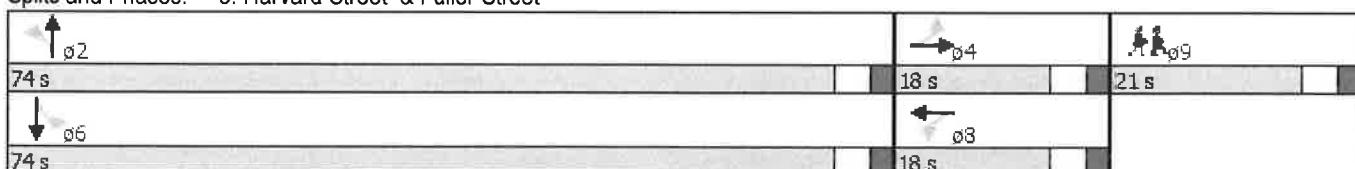
Intersection LOS: B

Intersection Capacity Utilization 51.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Harvard Street & Fuller Street



Lane Group	ø9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	4.0
Minimum Split (s)	21.0
Total Split (s)	21.0
Total Split (%)	19%
Maximum Green (s)	16.0
Yellow Time (s)	3.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	131	62	29	532	14	586
v/c Ratio	0.65	0.26	0.05	0.39	0.02	0.43
Control Delay	53.2	38.2	3.3	4.9	3.1	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.2	38.2	3.3	4.9	3.1	5.2
Queue Length 50th (ft)	73	33	4	89	2	103
Queue Length 95th (ft)	#141	70	10	133	6	153
Internal Link Dist (ft)	110	133		203		124
Turn Bay Length (ft)			80		50	
Base Capacity (vph)	219	264	567	1363	589	1366
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.23	0.05	0.39	0.02	0.43

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Harvard Street at Coolidge Street

6: Harvard Street & Coolidge Street

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	10	26	3	4	8	18	418	9	15	487	5
Conflicting Peds, #/hr	0	0	0	3	0	4	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	75	75	75	87	87	87	91	91	91
Heavy Vehicles, %	0	0	4	0	0	0	6	3	0	7	3	0
Mvmt Flow	6	15	40	4	5	11	21	480	10	16	535	5

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	1110 1107 538	1130 1105 490	541 0 0	495 0 0
Stage 1	571 571 -	531 531 -	- - -	- - -
Stage 2	539 536 -	599 574 -	- - -	- - -
Critical Hdwy	7.1 6.5 6.24	7.1 6.5 6.2	4.16 - -	4.17 - -
Critical Hdwy Stg 1	6.1 5.5 -	6.1 5.5 -	- - -	- - -
Critical Hdwy Stg 2	6.1 5.5 -	6.1 5.5 -	- - -	- - -
Follow-up Hdwy	3.5 4 3.336	3.5 4 3.3	2.254 - -	2.263 - -
Pot Cap-1 Maneuver	188 212 539	183 213 582	1008 - -	1043 - -
Stage 1	509 508 -	536 529 -	- - -	- - -
Stage 2	530 527 -	492 506 -	- - -	- - -
Platoon blocked, %	- - -	- - -	- - -	- - -
Mov Cap-1 Maneuver	174 201 539	153 202 580	1008 - -	1043 - -
Mov Cap-2 Maneuver	174 201 -	153 202 -	- - -	- - -
Stage 1	494 497 -	519 512 -	- - -	- - -
Stage 2	500 510 -	432 495 -	- - -	- - -

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.3	18.7	0.3	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBln1	WBln1	SBL	SBT	SBR
Capacity (veh/h)	1008	-	-	331	282	1043	-	-
HCM Lane V/C Ratio	0.021	-	-	0.186	0.071	0.016	-	-
HCM Control Delay (s)	8.6	0	-	18.3	18.7	8.5	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.2	0	-	-

6: Harvard Street & Coolidge Street

Intersection

Int Delay, s/veh 1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	8	17	3	3	9	10	463	26	12	487	18
Conflicting Peds, #/hr	0	0	0	3	0	4	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	93	93	93	92	92	92
Heavy Vehicles, %	0	13	0	0	0	0	0	2	0	0	2	0
Mvmt Flow	8	11	23	4	4	12	11	498	28	13	529	20

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1110	1116	539	1119	1112	516	549	0	0	530	0	0
Stage 1	565	565	-	537	537	-	-	-	-	-	-	-
Stage 2	545	551	-	582	575	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.63	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.63	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.63	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.117	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	188	198	546	186	211	563	1031	-	-	1048	-	-
Stage 1	513	491	-	532	526	-	-	-	-	-	-	-
Stage 2	526	498	-	502	506	-	-	-	-	-	-	-
Platoon blocked, %							-	-	-	-	-	-
Mov Cap-1 Maneuver	177	191	546	166	203	561	1031	-	-	1048	-	-
Mov Cap-2 Maneuver	177	191	-	166	203	-	-	-	-	-	-	-
Stage 1	505	482	-	522	516	-	-	-	-	-	-	-
Stage 2	503	489	-	462	497	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.5	17.5	0.2	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1031	-	-	290	307	1048	-	-
HCM Lane V/C Ratio	0.01	-	-	0.143	0.065	0.012	-	-
HCM Control Delay (s)	8.5	0	-	19.5	17.5	8.5	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.2	0	-	-

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	11	28	3	4	9	19	486	10	16	552	5
Conflicting Peds, #/hr	0	0	0	3	0	4	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	4	0	0	0	6	3	0	7	3	0
Mvmt Flow	4	12	30	3	4	10	21	528	11	17	600	5

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	1224	1222	603	1238
Stage 1	638	638	-	579
Stage 2	586	584	-	659
Critical Hdwy	7.1	6.5	6.24	7.1
Critical Hdwy Stg 1	6.1	5.5	-	6.1
Critical Hdwy Stg 2	6.1	5.5	-	5.5
Follow-up Hdwy	3.5	4	3.336	3.5
Pot Cap-1 Maneuver	157	181	495	154
Stage 1	468	474	-	504
Stage 2	500	501	-	456
Platoon blocked, %				
Mov Cap-1 Maneuver	145	170	495	130
Mov Cap-2 Maneuver	145	170	-	171
Stage 1	453	462	-	487
Stage 2	472	484	-	406
545	547	-	954	-
				1001
				-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.8	20.2	0.3	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBln1	WBln1	SBL	SBT	SBR
Capacity (veh/h)	954	-	-	289	254	1001	-	-
HCM Lane V/C Ratio	0.022	-	-	0.162	0.068	0.017	-	-
HCM Control Delay (s)	8.9	0	-	19.8	20.2	8.7	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0.1	-	-

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	9	18	3	3	10	11	525	28	13	551	19
Conflicting Peds, #/hr	0	0	0	3	0	4	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	93	93	93	92	92	92
Heavy Vehicles, %	0	13	0	0	0	0	0	2	0	0	2	0
Mvmt Flow	7	10	20	3	3	11	12	565	30	14	599	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1252	1260	609	1259	1255	584	620	0	0	599	0	0
Stage 1	638	638	-	607	607	-	-	-	-	-	-	-
Stage 2	614	622	-	652	648	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.63	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.63	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.63	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.117	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	151	162	499	149	173	515	970	-	-	988	-	-
Stage 1	468	454	-	487	489	-	-	-	-	-	-	-
Stage 2	483	462	-	460	469	-	-	-	-	-	-	-
Platoon blocked, %							-	-	-	-	-	-
Mov Cap-1 Maneuver	141	155	499	132	165	513	970	-	-	988	-	-
Mov Cap-2 Maneuver	141	155	-	132	165	-	-	-	-	-	-	-
Stage 1	459	444	-	476	478	-	-	-	-	-	-	-
Stage 2	461	452	-	423	459	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.5	19.5	0.2	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	970	-	-	241	265	988	-	-
HCM Lane V/C Ratio	0.012	-	-	0.149	0.066	0.014	-	-
HCM Control Delay (s)	8.8	0	-	22.5	19.5	8.7	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.2	0	-	-

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	11	28	3	4	9	19	489	10	16	553	5
Conflicting Peds, #/hr	0	0	0	3	0	4	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	4	0	0	0	6	3	0	7	3	0
Mvmt Flow	4	12	30	3	4	10	21	532	11	17	601	5

Major/Minor	Minor2	Minor1	Major1	Major2
Conflicting Flow All	1228	1227	604	1242
Stage 1	639	639	-	582
Stage 2	589	588	-	660
Critical Hdwy	7.1	6.5	6.24	7.1
Critical Hdwy Stg 1	6.1	5.5	-	6.1
Critical Hdwy Stg 2	6.1	5.5	-	5.5
Follow-up Hdwy	3.5	4	3.336	3.5
Pot Cap-1 Maneuver	156	180	495	153
Stage 1	468	474	-	502
Stage 2	498	499	-	455
Platoon blocked, %				
Mov Cap-1 Maneuver	144	169	495	129
Mov Cap-2 Maneuver	144	169	-	129
Stage 1	453	462	-	484
Stage 2	469	481	-	405
95th %tile Q(veh)				

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.9	20.3	0.3	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	952	-	-	288	253	999	-	-
HCM Lane V/C Ratio	0.022	-	-	0.162	0.069	0.017	-	-
HCM Control Delay (s)	8.9	0	-	19.9	20.3	8.7	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.6	0.2	0.1	-	-

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	6	9	18	3	3	10	11	527	28	13	554	19
Conflicting Peds, #/hr	0	0	0	3	0	4	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	93	93	93	92	92	92
Heavy Vehicles, %	0	13	0	0	0	0	0	2	0	0	2	0
Mvmt Flow	7	10	20	3	3	11	12	567	30	14	602	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1257	1265	613	1264	1260	586	623	0	0	601	0	0
Stage 1	641	641	-	609	609	-	-	-	-	-	-	-
Stage 2	616	624	-	655	651	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.63	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.63	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.63	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.117	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	149	161	496	148	172	514	968	-	-	986	-	-
Stage 1	466	453	-	486	488	-	-	-	-	-	-	-
Stage 2	481	461	-	458	468	-	-	-	-	-	-	-
Platoon blocked, %							-	-	-	-	-	-
Mov Cap-1 Maneuver	139	154	496	131	164	512	968	-	-	986	-	-
Mov Cap-2 Maneuver	139	154	-	131	164	-	-	-	-	-	-	-
Stage 1	457	443	-	475	477	-	-	-	-	-	-	-
Stage 2	459	451	-	421	458	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.7	19.7	0.2	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	968	-	-	239	263	986	-	-
HCM Lane V/C Ratio	0.012	-	-	0.15	0.066	0.014	-	-
HCM Control Delay (s)	8.8	0	-	22.7	19.7	8.7	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.2	0	-	-

Fuller Street at Site Drive

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Vol, veh/h	1	130		164	0	1	0
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Free	Free		Free	Free	Stop	Stop
RT Channelized	-	None		-	None	-	None
Storage Length	-	-		-	-	0	-
Veh in Median Storage, #	-	0		0	-	0	-
Grade, %	-	0		0	-	0	-
Peak Hour Factor	83	83		67	67	25	25
Heavy Vehicles, %	0	0		1	0	0	0
Mvmt Flow	1	157		245	0	4	0

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	245	0		-	0	404	245
Stage 1	-	-		-	-	245	-
Stage 2	-	-		-	-	159	-
Critical Hdwy	4.1	-		-	-	6.4	6.2
Critical Hdwy Stg 1	-	-		-	-	5.4	-
Critical Hdwy Stg 2	-	-		-	-	5.4	-
Follow-up Hdwy	2.2	-		-	-	3.5	3.3
Pot Cap-1 Maneuver	1333	-		-	-	606	799
Stage 1	-	-		-	-	800	-
Stage 2	-	-		-	-	875	-
Platoon blocked, %	-			-	-		
Mov Cap-1 Maneuver	1333	-		-	-	605	799
Mov Cap-2 Maneuver	-	-		-	-	605	-
Stage 1	-	-		-	-	800	-
Stage 2	-	-		-	-	874	-

Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		11	
HCM LOS					B	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1333	-	-	-	605
HCM Lane V/C Ratio	0.001	-	-	-	0.007
HCM Control Delay (s)	7.7	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	112		89	0	1
Conflicting Peds, #/hr	0	0		0	0	0
Sign Control	Free	Free		Free	Free	Stop
RT Channelized	-	None		-	None	-
Storage Length	-	-		-	-	0
Veh in Median Storage, #	-	0		0	-	0
Grade, %	-	0		0	-	0
Peak Hour Factor	76	76		75	75	50
Heavy Vehicles, %	0	0		0	0	0
Mvmt Flow	0	147		119	0	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	119	0		-	0	266
Stage 1	-	-		-	-	119
Stage 2	-	-		-	-	147
Critical Hdwy	4.1	-		-	-	6.4
Critical Hdwy Stg 1	-	-		-	-	5.4
Critical Hdwy Stg 2	-	-		-	-	5.4
Follow-up Hdwy	2.2	-		-	-	3.5
Pot Cap-1 Maneuver	1482	-		-	-	727
Stage 1	-	-		-	-	911
Stage 2	-	-		-	-	885
Platoon blocked, %	-			-	-	
Mov Cap-1 Maneuver	1482	-		-	-	727
Mov Cap-2 Maneuver	-	-		-	-	727
Stage 1	-	-		-	-	911
Stage 2	-	-		-	-	885

Approach	EB		WB		SB	
HCM Control Delay, s	0		0		9.4	
HCM LOS					A	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1482	-	-	-	819
HCM Lane V/C Ratio	-	-	-	-	0.005
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Vol, veh/h	1	139		176	0	1	0
Conflicting Peds, #/hr	0	0		0	0	0	0
Sign Control	Free	Free		Free	Free	Stop	Stop
RT Channelized	-	None		-	None	-	None
Storage Length	-	-		-	-	0	-
Veh in Median Storage, #	-	0		0	-	0	-
Grade, %	-	0		0	-	0	-
Peak Hour Factor	92	92		92	92	92	92
Heavy Vehicles, %	0	0		1	0	0	0
Mvmt Flow	1	151		191	0	1	0

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	191	0		-	0	344	191
Stage 1	-	-		-	-	191	-
Stage 2	-	-		-	-	153	-
Critical Hdwy	4.1	-		-	-	6.4	6.2
Critical Hdwy Stg 1	-	-		-	-	5.4	-
Critical Hdwy Stg 2	-	-		-	-	5.4	-
Follow-up Hdwy	2.2	-		-	-	3.5	3.3
Pot Cap-1 Maneuver	1395	-		-	-	657	856
Stage 1	-	-		-	-	846	-
Stage 2	-	-		-	-	880	-
Platoon blocked, %	-			-	-		
Mov Cap-1 Maneuver	1395	-		-	-	656	856
Mov Cap-2 Maneuver	-	-		-	-	656	-
Stage 1	-	-		-	-	846	-
Stage 2	-	-		-	-	879	-

Approach	EB		WB		SB
HCM Control Delay, s	0.1		0		10.5
HCM LOS					B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1395	-	-	-	656
HCM Lane V/C Ratio	0.001	-	-	-	0.002
HCM Control Delay (s)	7.6	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	120		95	0	1
Conflicting Peds, #/hr	0	0		0	0	0
Sign Control	Free	Free		Free	Free	Stop
RT Channelized	-	None		-	None	-
Storage Length	-	-		-	0	-
Veh in Median Storage, #	-	0		0	-	0
Grade, %	-	0		0	-	0
Peak Hour Factor	92	92		92	92	92
Heavy Vehicles, %	0	0		0	0	0
Mvmt Flow	0	130		103	0	1

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	103	0		-	0	233
Stage 1	-	-		-	-	103
Stage 2	-	-		-	-	130
Critical Hdwy	4.1	-		-	-	6.4
Critical Hdwy Stg 1	-	-		-	-	5.4
Critical Hdwy Stg 2	-	-		-	-	5.4
Follow-up Hdwy	2.2	-		-	-	3.5
Pot Cap-1 Maneuver	1502	-		-	-	760
Stage 1	-	-		-	-	926
Stage 2	-	-		-	-	901
Platoon blocked, %	-	-		-	-	-
Mov Cap-1 Maneuver	1502	-		-	-	760
Mov Cap-2 Maneuver	-	-		-	-	760
Stage 1	-	-		-	-	926
Stage 2	-	-		-	-	901

Approach	EB		WB		SB	
HCM Control Delay, s	0		0		9.3	
HCM LOS					A	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1502	-	-	-	847
HCM Lane V/C Ratio	-	-	-	-	0.003
HCM Control Delay (s)	0	-	-	-	9.3
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	139		176	2	6
Conflicting Peds, #/hr	0	0		0	0	0
Sign Control	Free	Free		Free	Free	Stop
RT Channelized	-	None		-	None	-
Storage Length	-	-		-	-	0
Veh in Median Storage, #	-	0		0	-	0
Grade, %	-	0		0	-	0
Peak Hour Factor	92	92		92	92	92
Heavy Vehicles, %	0	0		1	0	0
Mvmt Flow	1	151		191	2	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	193	0		-	0	345
Stage 1	-	-		-	-	192
Stage 2	-	-		-	-	153
Critical Hdwy	4.1	-		-	-	6.4
Critical Hdwy Stg 1	-	-		-	-	5.4
Critical Hdwy Stg 2	-	-		-	-	5.4
Follow-up Hdwy	2.2	-		-	-	3.5
Pot Cap-1 Maneuver	1392	-		-	-	656
Stage 1	-	-		-	-	845
Stage 2	-	-		-	-	880
Platoon blocked, %	-	-		-	-	-
Mov Cap-1 Maneuver	1392	-		-	-	655
Mov Cap-2 Maneuver	-	-		-	-	655
Stage 1	-	-		-	-	845
Stage 2	-	-		-	-	879

Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		10.4	
HCM LOS					B	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1392	-	-	-	678	
HCM Lane V/C Ratio	0.001	-	-	-	0.011	
HCM Control Delay (s)	7.6	0	-	-	10.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	1	120		95 5	4	2
Conflicting Peds, #/hr	0	0		0 0	0	0
Sign Control	Free	Free		Free Free	Stop	Stop
RT Channelized	-	None		- None	-	None
Storage Length	-	-		- -	0	-
Veh in Median Storage, #	-	0		0 -	0	-
Grade, %	-	0		0 -	0	-
Peak Hour Factor	92	92		92 92	92	92
Heavy Vehicles, %	0	0		0 0	0	0
Mvmt Flow	1	130		103 5	4	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	109	0		- 0	239	106
Stage 1	-	-		- -	106	-
Stage 2	-	-		- -	133	-
Critical Hdwy	4.1	-		- -	6.4	6.2
Critical Hdwy Stg 1	-	-		- -	5.4	-
Critical Hdwy Stg 2	-	-		- -	5.4	-
Follow-up Hdwy	2.2	-		- -	3.5	3.3
Pot Cap-1 Maneuver	1494	-		- -	754	954
Stage 1	-	-		- -	923	-
Stage 2	-	-		- -	898	-
Platoon blocked, %	-			- -		
Mov Cap-1 Maneuver	1494	-		- -	753	954
Mov Cap-2 Maneuver	-	-		- -	753	-
Stage 1	-	-		- -	923	-
Stage 2	-	-		- -	897	-

Approach	EB		WB		SB	
HCM Control Delay, s	0.1		0		9.5	
HCM LOS					A	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1494	-	-	-	810
HCM Lane V/C Ratio	0.001	-	-	-	0.008
HCM Control Delay (s)	7.4	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

REVISED SCHEME - ACCESS FROM FULLER

REVISED EDITION

REVISED SCHEME - ACCESS FROM AUGUST 8, 2016

5107

" = 10⁻⁰"

GE LEVEL

NUMBER

100

STUDIO, LLC



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REVISED SCHEM

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ISSUE: REVISED SCHEME - ACCESS FROM FULLER
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PROJECT #: 15107
SCALE: 1/8" = 1'-0"DRAWING TITLE
FLOOR PLAN
LEVEL 2

DRAWING NUMBER

A102

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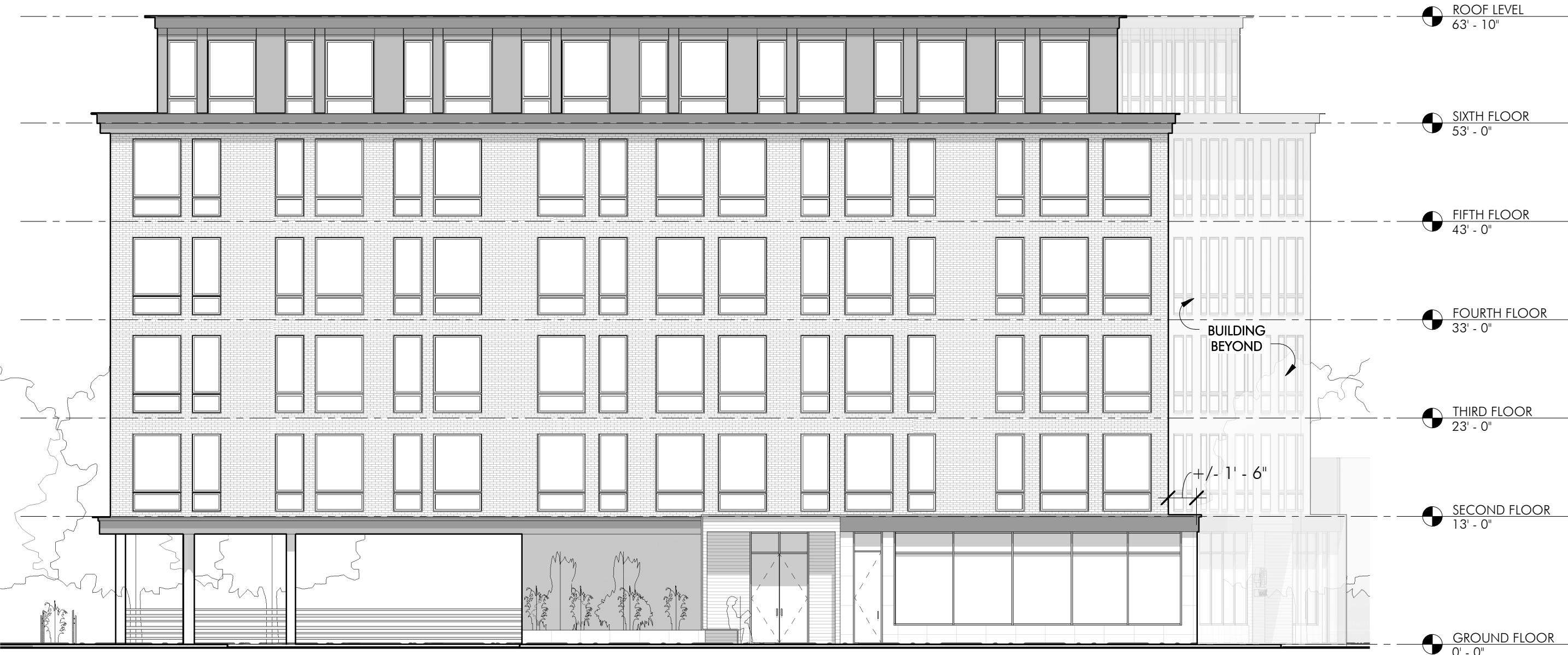
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TECTURE + DESIGN

EET, 3RD FLOOR
MA 02127
66.8330 F: 617.766.8331
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WARD ASSOCIATES, LLC



1 HARVARD STREET ELEVATION



FULLER ST ELEVATION



SOUTH ELEVATION



WEST ELEVATION

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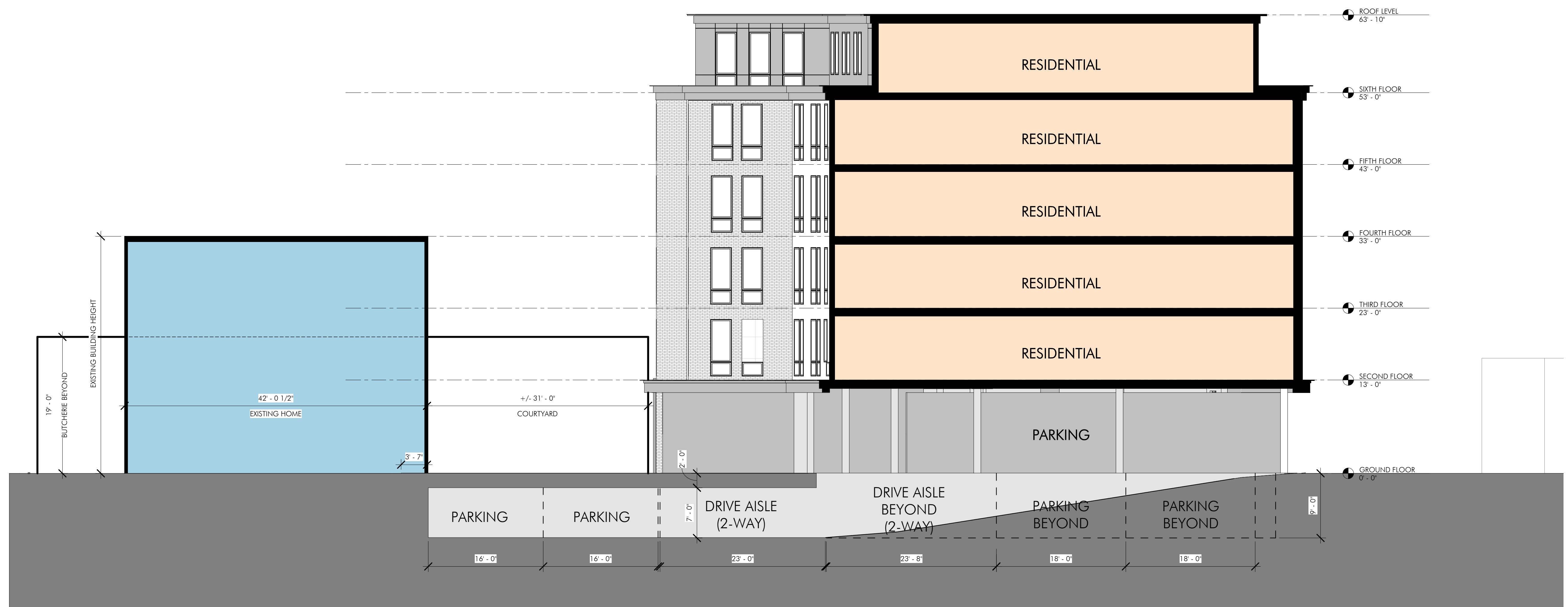
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RAMP SECTION

DRAWING NUMBER

A204

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PROJECT #:	15107
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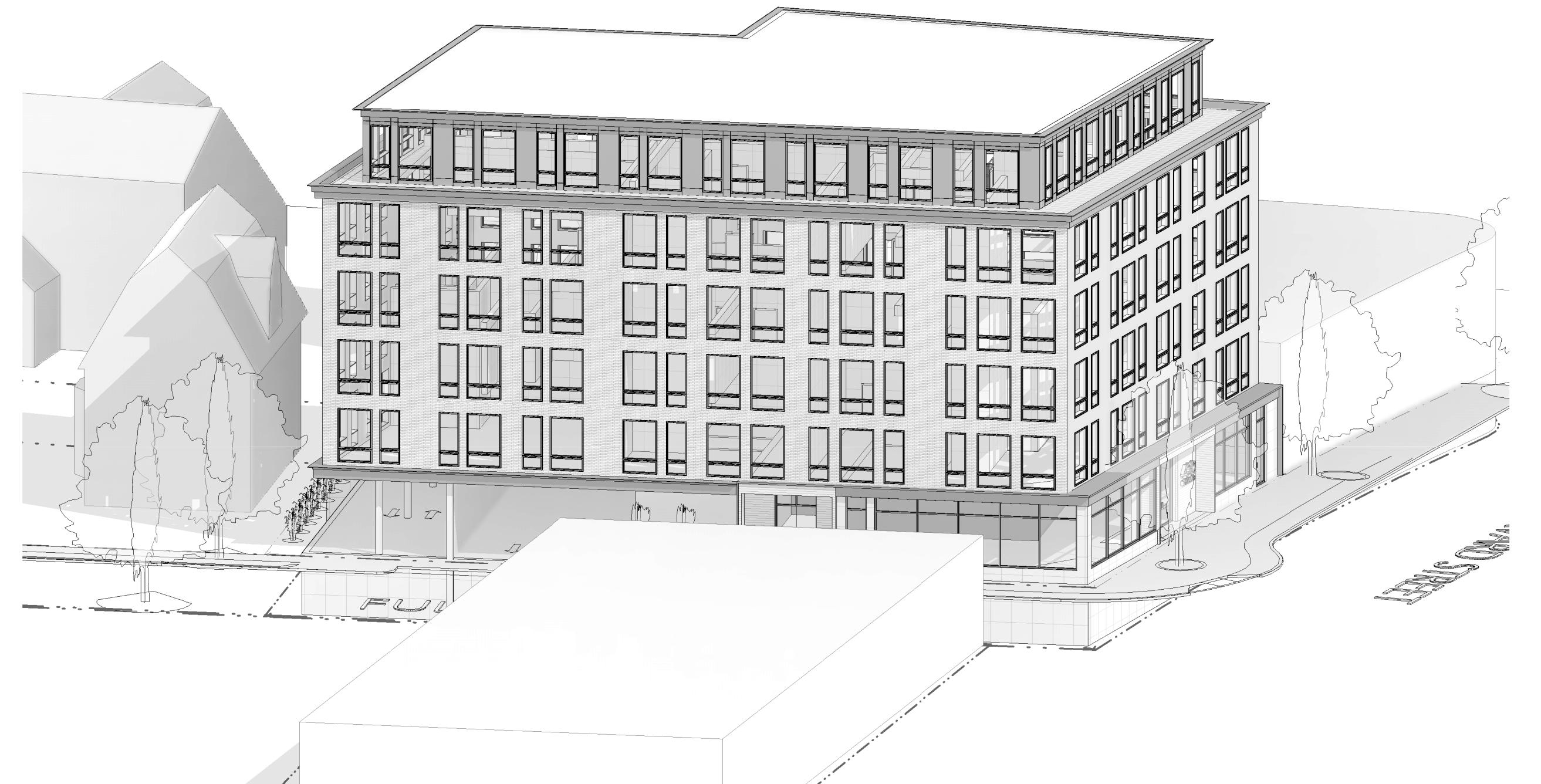
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1 AERIAL FROM WEST



2 AERIAL AT CORNER OF HARVARD AND FULLER



3 BIRD'S EYE PERSPECTIVE